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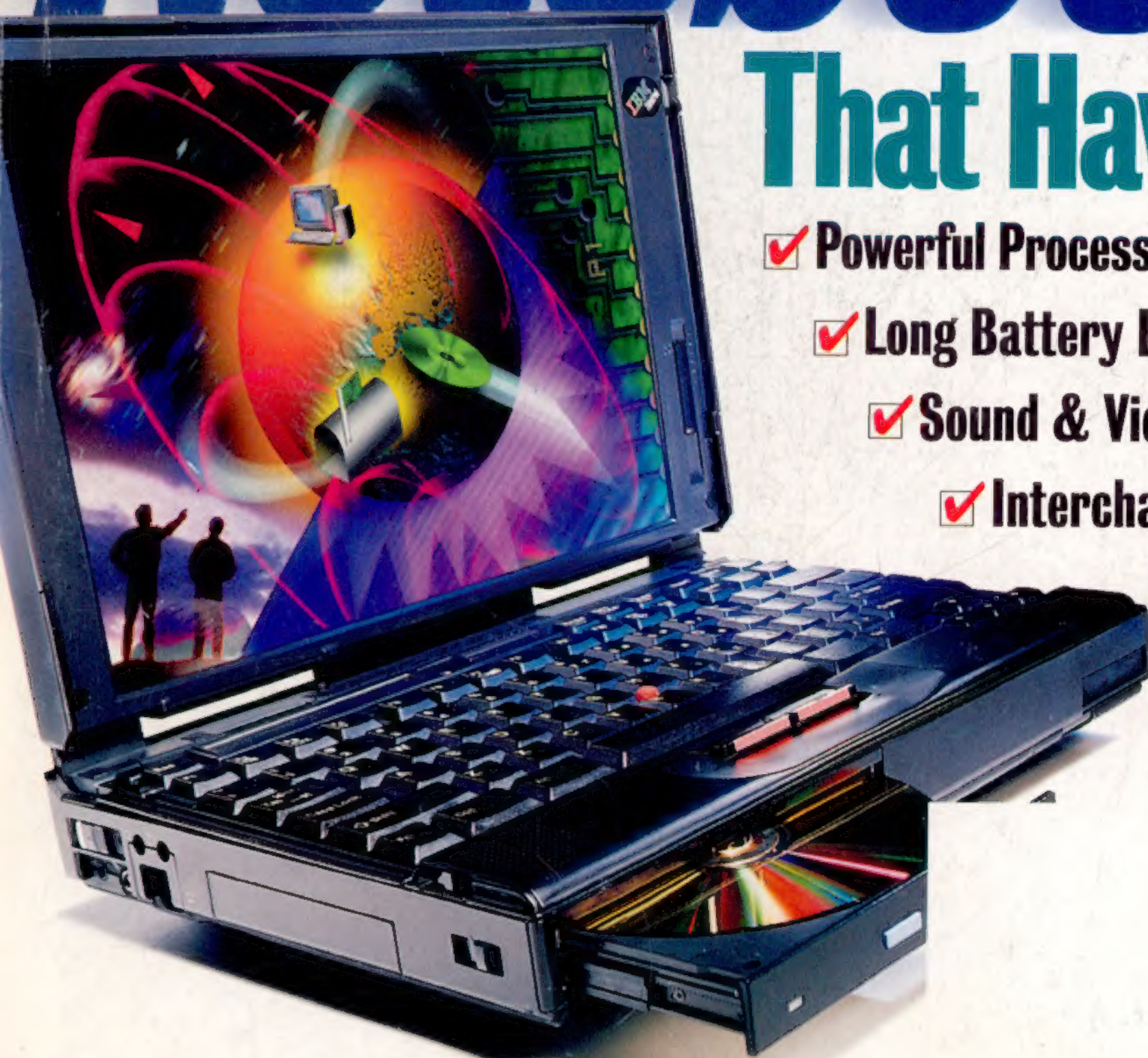
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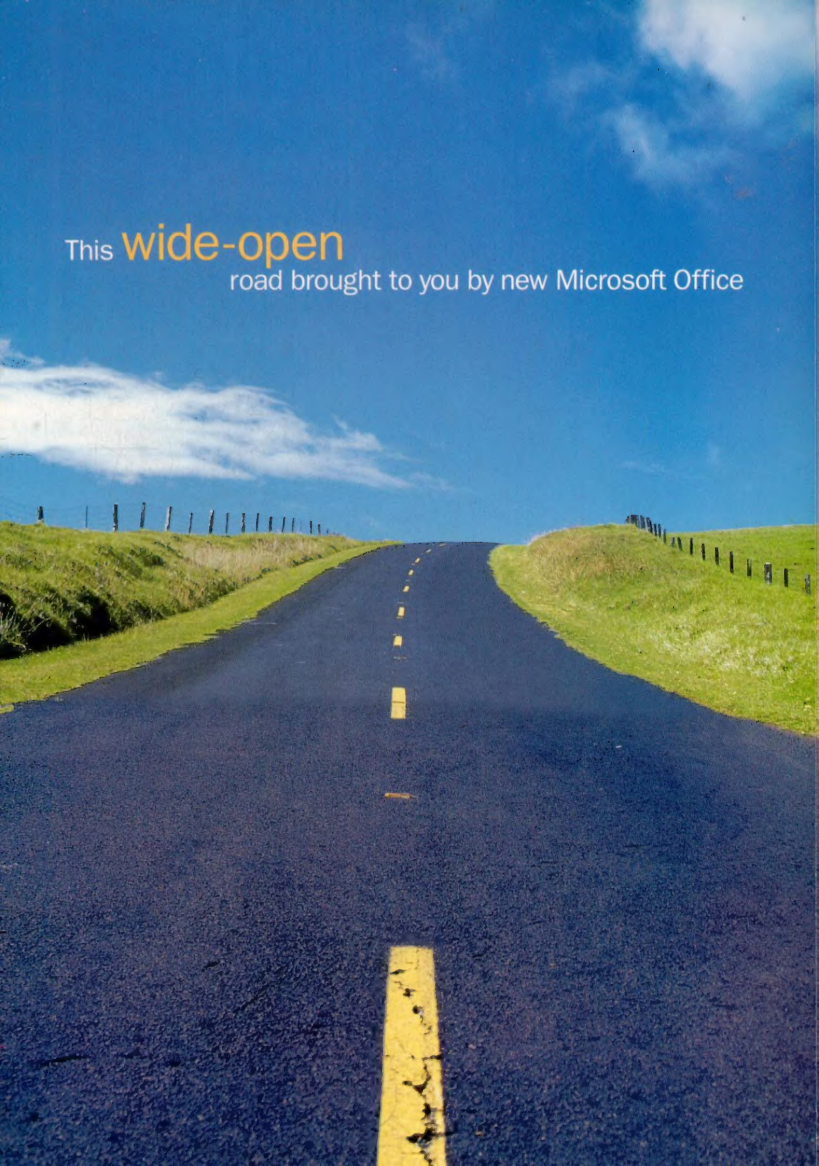
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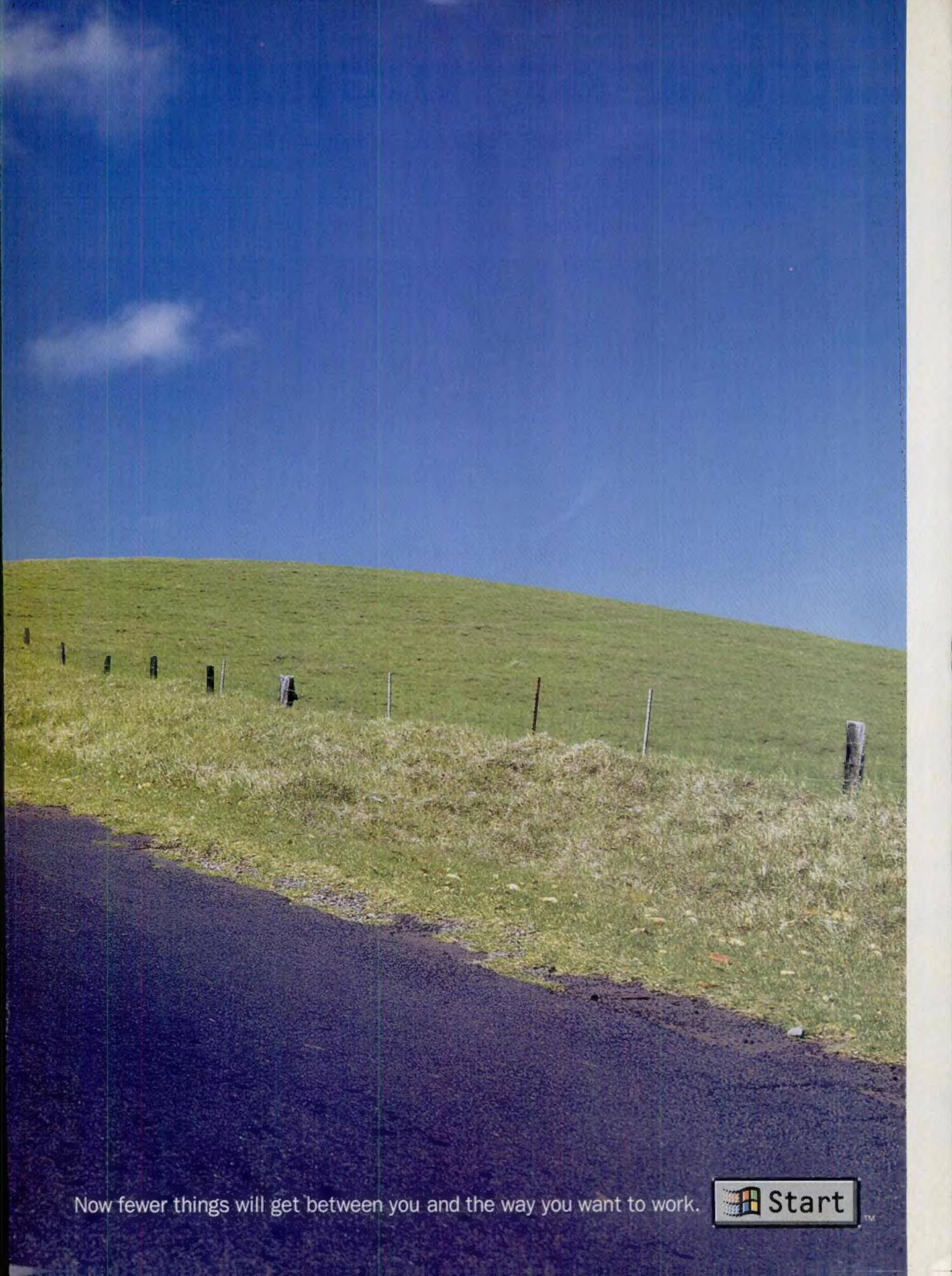
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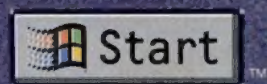
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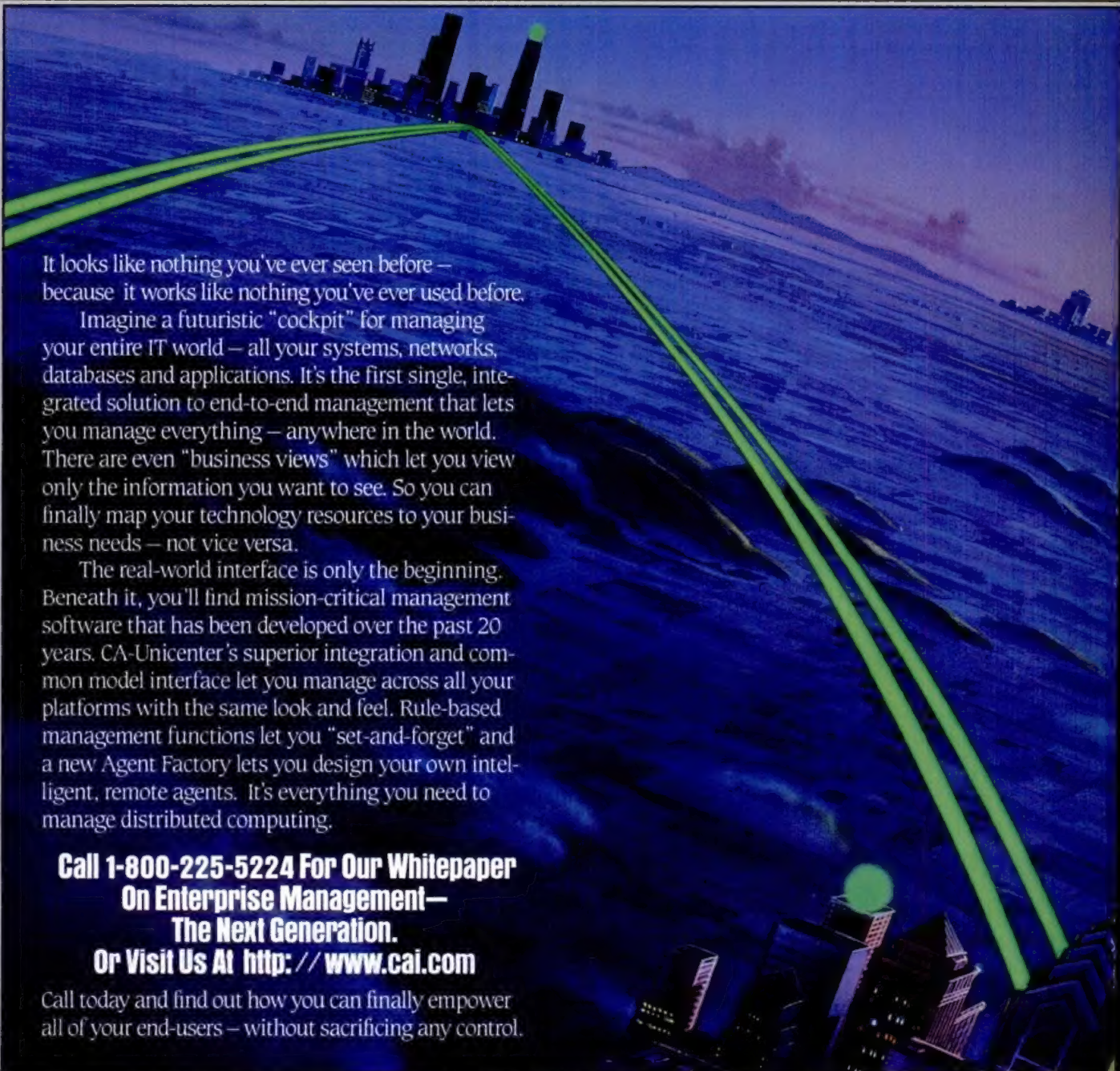




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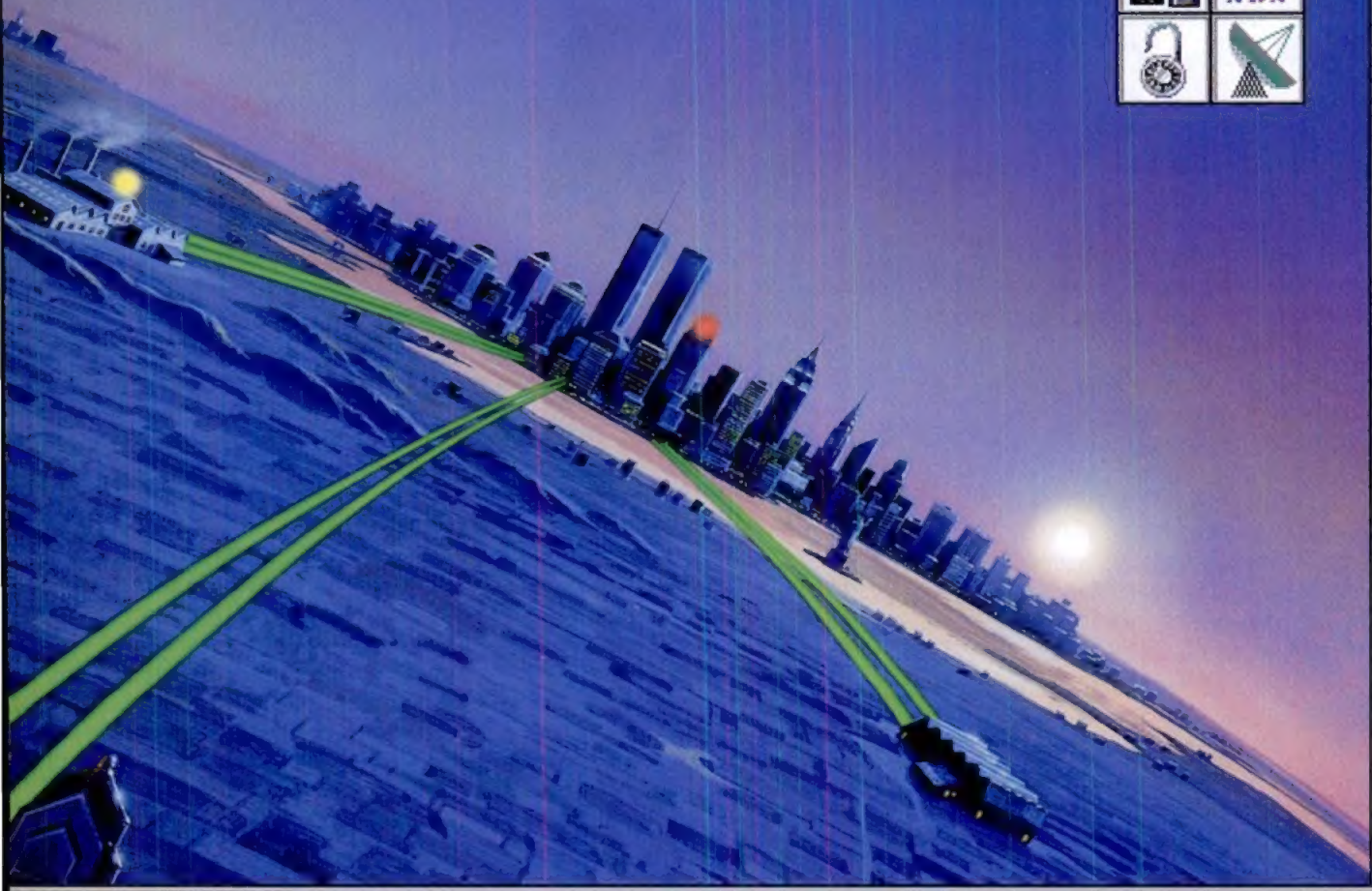
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Inside

The one thing we know about the PC industry is that it is always changing. Something new is always on the horizon.

Figuring out what is important among the dozens of new product announcements, strategic alliances, and technolo-

gy demonstrations requires not only a keen knowledge of PC technology but also an understanding of how people use that technology in the real world.

At *PC Magazine*, the two people most responsible for delivering the news

and telling you what it means are West Coast senior editor or Sebastian Rupley and associate editor Carol Levin, who form the nucleus of our Trends section. Every issue, they work with their colleagues—senior editor Brian Nadel, our First Looks team, PC

Labs technicians, and our stable of contributing editors—to tell you not only what's new but also what's important.

Of course, the role of our Trends section has changed dramatically over the past few years. The huge growth of on-line services and the Internet has meant that more and more of you are joining us on-line to find the latest news.

In response, we've updated

our Trends coverage so that you will find daily Trends Online, both at PC MagNet on ZD Net/CompuServe (Go ZNT: Editor) and at our Web site (www.pcmag.com). Our Web site complements the larger news services provided by the overall ZD Net

site (www.zdnet.com), which was recently named one of the "Best of the Web" by GNN.

Carol and Sebastian have taken on the challenge of daily reporting with relish, seeing it as an opportunity to provide more information and to deliver it in a more timely and efficient fashion.

But the print magazine in your hands remains our primary information delivery mechanism, and with this issue it reflects the new on-line world even more faithfully. In our redesigned Trends section, starting on page 31, you'll see more coverage of on-line in general as well as links to our on-line coverage—in addition to the reports on new and emerging technologies you've come to expect.—*Michael J. Miller*



The Trends team:
**Carol Levin (East Coast) and
Sebastian Rupley (West Coast).**

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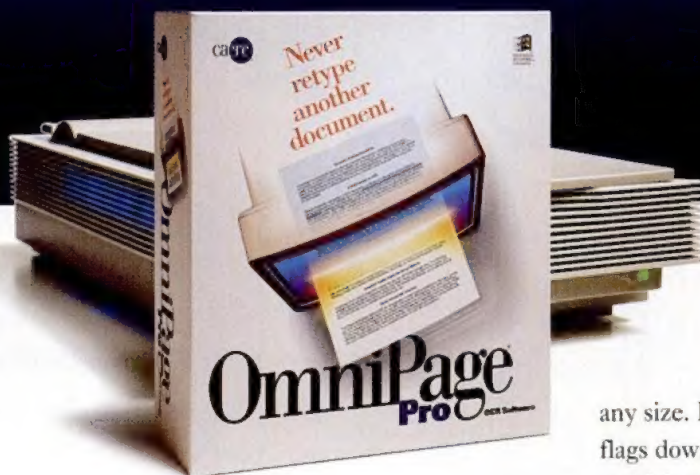
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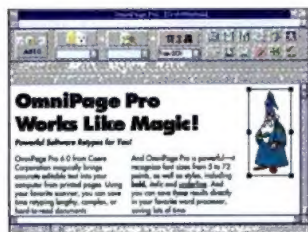
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Logitech's PageScan: Equal parts color and convenience (page 43).

COVER STORY

Color Pentium Notebooks

ON THE ROAD WITH THE PENTIUM



BY ROBERT S. ANTHONY The closing gap between desktop and portable power means compromising far less than you might think when you're shopping for a notebook. The 41 color Pentium-class notebooks we tested—which span the price spectrum from \$2,500 to nearly \$8,000—incorporate many desktop-level features, including 1GB-plus hard disks, SVGA-capable displays, and even dual- and quad-speed CD-ROM drives. One is sure to suit your needs.....100

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CD-ROM Drives: The Third Generation

BY JAMES KARNEY

Once considered a luxury, the CD-ROM drive has become as standard as a color monitor. Retailers are already pushing aside quad-speed drives to create shelf space for 4.4X, 6X, and even 8X drives. The looming questions, though, are: Do you really need all that speed? And when will your 4X drive become obsolete? PC Magazine Labs tests five of the latest 6X CD-ROM players and one 8X unit to show you what the extra throughput might mean for your favorite apps177



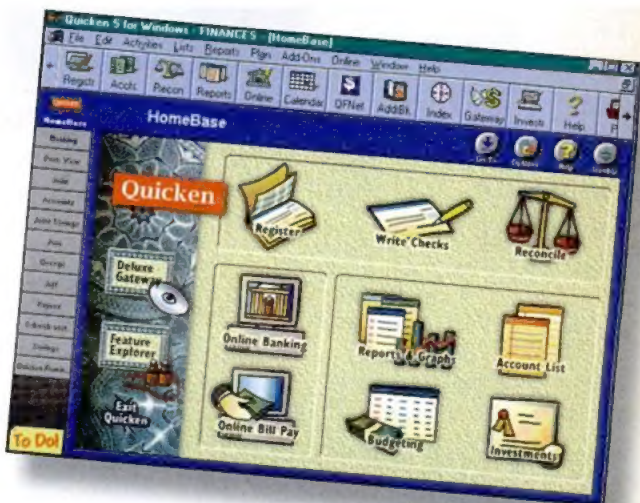
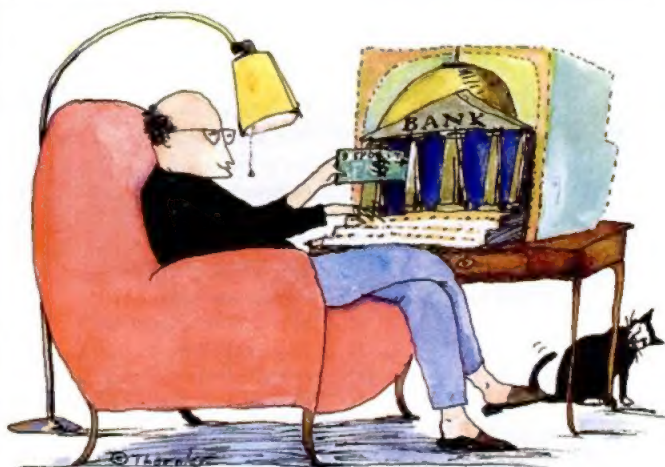
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Personal Finance: Banking on Your PC

BY KATHY YAKAL

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No workplace issue is more important than proper ergonomics. Just ask Barbie (page 350).

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What's New Online

Every Wednesday, Don Willmott, an executive editor at *PC Magazine*, puts his personal spin on the World Wide Web, discovering sites that are new, noteworthy, and thought-provoking. On January 10, Don gives you ten reasons why the World Wide Web is better than TV. Come visit *PC Magazine's* Web site and read his column, Willmott's Web. You're guaranteed to come away a little more Net-savvy.



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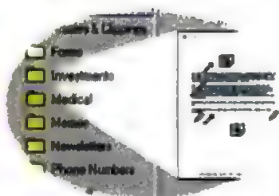
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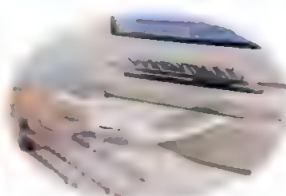
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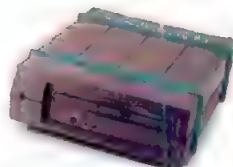
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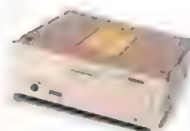
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Letters

GRANDMA'S COMPUTER

Congratulations to John C. Dvorak on his column "Grandma's Old Computer" (September 16, 1995). Welcome to the club. Finally, for those of us with home PCs and no corporate budgets to work with, the "upgrade-components-as-you-go" policy that many of us have used quite successfully has been blessed by the guru of product recommendations.

DAVID M. RANDALL
via the Internet

Attributing the desire to keep old boxes alive and capable to the same impulse that pushes us to fix up old cars or boats or decorate our houses with obsolete but interesting furniture is good sosh. Of course, frugality has its place, but it is more the need to put our personal stamp on things and show that we were brilliant in the first place that makes this trend of upgrading old computers so real.

SANDY WARRICK
Kihei, Hawaii

I was reading Dvorak's column with interest until I reached his concluding paragraphs. I am a woman, and I—not my husband—am the one in our family interested in making computers go faster and do more. I resent Dvorak's implication that only men "play with their computers." Women may be computer junkies, too.

LYNN STEVENS
Tucson, Arizona

Dvorak's between-the-lines implication that women cannot handle working on the upgrade of an older computer is a sadly outdated and, dare I say it, mildly sexist misconception. The generalization that only men care about upgrading computers is a sad example of what our society considers to be a "guy thing" or a "girl thing." I am a woman who has practically built her own computer, and who routinely teaches male coworkers how to use their computers. There is no gender limitation on technology.

J. ROBERSON
via the Internet

Dvorak probably did not intend to be sexist. I would just like to remind him, as well as the male-dominated computer industry, that there are women out there who get a great deal of satisfaction from tinkering with, repairing, and upgrading PCs—old and new. There are certainly fewer of us than there are male hardware jockeys, but we are no less passionate about our hobby. . . and we are spending money on do-it-yourself upgrades. Some of us even get paid for being propellerheads, and we're proud of it.

JANET GOLDSTEIN
Fairfax, Virginia



*There's no completely fair way
to compare operating systems;
you came as close as one could.*

If I were Grandma and came home one day expecting to use my old WordPerfect for DOS, and I found that my computer now had the much slower WordPerfect for Windows, I would be furious. If I were Grandma, I'd be so mad I might even go on strike and stop baking pies for a few days.

The computer industry now scrambles to offer upgrades constantly so our systems can scream, ring, and whistle better than the systems of the other guys we know. I guess that approach works with the guys. But if the industry would offer some "sidegrades" that would make our older systems do new, useful things, they might find a lot of us Grandmas out there who were eager to buy.

GRETCHEN BECKER
via the Internet

APPLES AND ORANGES

You might be surprised to hear this from an OS/2 fan, but here I go: Great job on the comparison of Windows 95 with other PC operating systems ("Your Next Operating System," September 16, 1995). I thought you tackled a tough task quite well. There is no completely fair way to compare operating systems, but I thought you came about as close as one could. The review was filled with facts, not hype, and you avoided the trap of making an Editors' Choice when it truly would not have made sense.

MARK BRATCHER
via the Internet

Your reporting on 32-bit operating systems is becoming more balanced. I'd like to point out, however, that contrary to the myth that

there's a "scarcity of native applications" for OS/2 Warp, there are actually more than 2,500 productivity applications alone. Just because they're not all at your local Egghead doesn't mean they don't exist. Secondly, it should be pointed out that your benchmark tests are not necessarily accurate reflections of native OS/2-application performance. Only when *PC Magazine* weans itself off Winstone and Winbench will I place much faith in your performance results.

GILBERT PILI
via the Internet

My sincere congratulations. Your articles on Windows 95 are definitive. They detail precisely what every prospective upgrader would do, given infinite resources.

MARTHA DELEEUW
Key Biscayne, Florida

Thanks for the breadth and depth of your Windows 95 coverage. I found the detailed comparison pitting Windows 95 against Windows 3.x, OS/2, and Windows NT especially useful.

DAVID M. SCOTT
Round Rock, Texas

Your magazine continues to amaze me with its lack of objective reporting on operating-system issues. Windows 95 presents no new technology to the 32-bit operating-system market. Windows NT and OS/2, which are much better alternatives, are not covered in any depth in your issues. Rather than helping your readers choose an appropriate operating system, you continue to print hype for Microsoft.

RUSTY JEWETT
via the Internet

The September 26 issue is typically well done. But where in heck is the comparison between Windows 95 and the current Macintosh system 7.5.2?

CHARLES A. COHEN
Branford, Connecticut

I am puzzled by your "buy recommendation" for Windows 95. For most of us it would require upgrading our systems. If we did upgrade, we'd be in a position to use proper 32-bit systems like Unix, OS/2, and Windows NT, with all their benefits. Windows 95 is at best a transitional system. Wouldn't most of us be better off if we spent the time learning and acquiring software for a truly up-to-date, high-quality, robust operating system?

ASHISH SEN
Chicago, Illinois

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Letters

STRAY PERSPECTIVES ON WINDOWS 95

The rollout of Windows 95 would have been a prime opportunity for IBM to make inroads on Microsoft territory by emphasizing that while Windows 95 is a 1.0 release, OS/2 is a much more mature product. Given the virtual lack of OS/2 advertising before, during, and after Windows 95's release, it appears that IBM has dropped the ball once again.

PETER S. ELLIOTT
via the Internet

OS/2 is an excellent operating system, but IBM let Microsoft steal the show by not moving bullishly forward. Despite the continual delays of Windows 95's release, the Microsoft development staff was busy writing the apps that their new system needed to grow on. IBM was content to allow its baby to be fed by strangers.

LEE ALLISON
San Antonio, Texas

With the release of Windows 95, I think the beginning of the end has come for OS/2. I've been an avid OS/2 user, and I've found that although it's a poor operating system, it's good enough to run 32-bit Windows programs. In a year or two, there will be a large number of excellent Windows NT-compatible applications that will be adequately tested and debugged. Combined with a more usable interface, Windows NT will be an irresistible platform for the power user. I love OS/2, but I see Windows NT in my future. Forcing manufacturers to make their Windows 95 applications Windows NT-compatible is the smartest thing Microsoft has ever done.

CIARAN BRENNAN
via the Internet

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CORRECTIONS AND AMPLIFICATIONS

In our roundup of home PCs ("PC, Come Home," December 19, 1995), the Compaq Presario 9546's Suitability to Task rating for "productivity" should have been *good*. In the same article, the Service & Reliability key should have offered only these possible responses: *better than average, average, and worse than average*.

In our review of Xerox network laser printers ("Network Printers: All Queued Up?" November 7, 1995), the photo shown is of the Xerox 4230/MRP laser printer and not the Xerox 4520mp, as stated in the caption.

In "Understanding Objects" (PC Tech, November 7, 1995), we discussed the inheritance model of Powersoft Corp.'s PowerBuilder 3.0a, a version that was then out of date. The version currently shipping, PowerBuilder 4.0, did not change this inheritance model significantly, although it offers improved performance at object instantiation.

The one machine in my graphics-design shop that's running Windows 95 has tons of system resources—as opposed to the Windows 3.11 machines. Windows 95 recognized all of the scanner, video, and CD cards in my unit without trouble. My 16-bit applications run just fine, and my favorite DOS games are each just a keystroke away. Windows 95 may not have recognized every piece of obscure, third-party junk I was running, but to expect perfection with every one of the 5,000 important programs we're currently running would be optimistic to an extreme. Microsoft has done a wonderful job of maintaining backward compatibility, but the time has come to cut some people loose. If you're bellyaching that Windows 95 won't run your favorite software, then just don't upgrade—use Windows 3.11.

RUSS E. STOLL
Chicago, Illinois

I love my new Windows 95 upgrade. It's only my second day and already I'm zooming around doing all kinds of work. . . . Oops! What's this? It says, "A Fatal Exception 0E has occurred at 0028:C0265189 in VXD. . . ." Hmmm. Is that some kind of Great Productivity Facility?

ROGER ROTHENBERGER
Hamilton, Georgia

I am all for progress in this fast-paced industry. But isn't there room for several markets, just as there are for automobiles? Not everyone has to drive a Ferrari; some of us do just fine with a Honda.

ROBERT CHAPMAN
Dexter, Michigan

Anyone considering "upgrading" to Windows 95 should be extremely wary of Plug and Play. From my experiences, the reality is that Plug and Play works only if the machine you're installing on is among the plainest of plain-vanilla PCs. More sophisticated systems are unable to move beyond Microsoft's limited Plug and Play support. Windows 95 has pushed me over the edge; I've decided to sell my Pentium system in favor of a Power Mac 9500.

MARK A. WEISS
New Milford, Connecticut

I was shocked at how many people went out and purchased the Windows 95 upgrade the day it was released. Have we really assessed our computing needs? Some of us may have been better off if we had not jumped on the bandwagon, and considered instead other options that are significantly less expensive but still go far to improve a PC's performance.

PATRICK G. HORNEKER
Valparaiso, Indiana

CABLE-MODEM REDUX

In response to John C. Dvorak's column "The Looming Cable Modem Fiasco" (September 12, 1995): The companies working on cable "modems" are working for the future. The infrastructure is not now in place, but it will be. When that happens, ISDN will become a footnote in data-transfer history. Future generations will see ISDN for what it is: a stop-gap technology.

MIKE REAGAN
Salt Lake City, Utah

TIME TO EXERCISE YOUR BRAIN

In his column "Windows 95 Brain Teasers" (September 12, 1995), Michael J. Miller states that in a choice between a 75-MHz Pentium with 16MB of RAM, and a 90-MHz Pentium with 8MB of RAM, the user should buy the former. That recommendation isn't forward-thinking. Average users will not want to ditch their machines; they'll want to upgrade them. But the only way to upgrade your CPU is to replace the chip. If you purchased a 90-MHz Pentium, you could upgrade by just filling in the blanks with another 8MB of RAM. This is more cost-effective, and you won't have any unused parts left over.

SEAN KASUN
via the Internet

I agree with Miller's comment that the thought of Microsoft becoming even more powerful is frightening. Microsoft has the ability and the drive to swallow up other software vendors whole, thereby eliminating the competition. I can only hope that the Justice Department will take a stand when this inevitably happens.

ALEXANDER VOGENTHALER
via the Internet

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DX4-100	\$1495	\$2695	DX4-100	\$1795	\$2895	DX4-100	CN! \$2095	CN! \$3195
➤ 4MB RAM ➤ 260MB IDE hard drive ➤ 800: Internal 3.5" 1.44MB floppy drive ➤ 400: 7.9" dual scan display; 800: 9.5" active matrix display ➤ MS-DOS 6.2 & Windows for Workgroups 3.11 ➤ MS Works			➤ 8MB RAM ➤ 350MB IDE hard drive ➤ 3.5" 1.44MB floppy drive. 400: External, 800: Internal ➤ 400: 7.9" dual scan display; 800: 9.5" active matrix display ➤ Custom nylon carrying case ➤ MS Windows® 95 or MS-DOS 6.2 & Windows for Workgroups 3.11 ➤ MS Works 95 or MS Works			➤ 8MB RAM ➤ IDE hard drive. 400: 350MB, 800: 528MB ➤ 3.5" 1.44MB floppy drive. 400: External, 800: Internal ➤ 400: 7.9" dual scan display; 800: 9.5" active matrix display ➤ 14.4 PCMCIA fax/modem ➤ Custom carrying case. 400: Leather, 800: Nylon ➤ Extra battery ➤ MS Windows 95 or MS-DOS 6.2 & Windows for Workgroups 3.11 ➤ MS Works 95 or MS Works		
Pentium® Processor	850C		Pentium® Processor	850C		Pentium® Processor	850C	
75MHz	\$2995		75MHz	\$3495		75MHz	\$3895	
90MHz	\$3195		90MHz	\$3695		90MHz	CN! \$4095	
➤ 8MB RAM, 256K synchronous SRAM cache ➤ 528MB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ 10.3" dual scan display ➤ Integrated 16-bit stereo sound ➤ MS Windows 95 or MS-DOS 6.2 & Windows for Workgroups 3.11 ➤ MS Works 95 or MS Works			➤ 16MB RAM, 256K synchronous SRAM cache ➤ 810MB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ 10.3" dual scan display ➤ Integrated 16-bit stereo sound ➤ Custom nylon carrying case ➤ Extra battery ➤ MS Windows 95 or MS-DOS 6.2 & Windows for Workgroups 3.11 ➤ MS Office Pro 95, or MS Office Pro			➤ 16MB RAM, 256K synchronous SRAM cache ➤ 1.3GB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ 10.3" dual scan display ➤ Integrated 16-bit stereo sound ➤ External amplified speakers ➤ 28.8 PCMCIA fax/modem ➤ Custom nylon carrying case ➤ Extra battery ➤ MS Windows 95 or MS-DOS 6.2 & Windows for Workgroups 3.11 ➤ MS Office Pro 95, or MS Office Pro		

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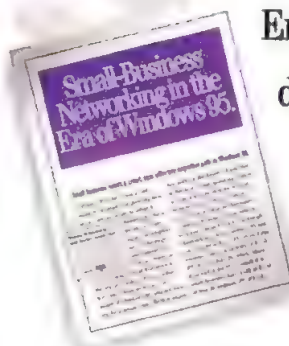
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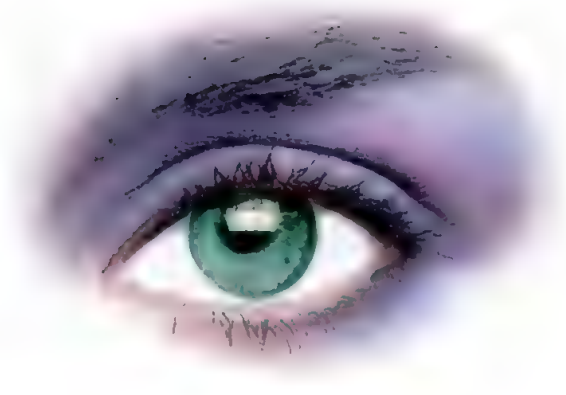
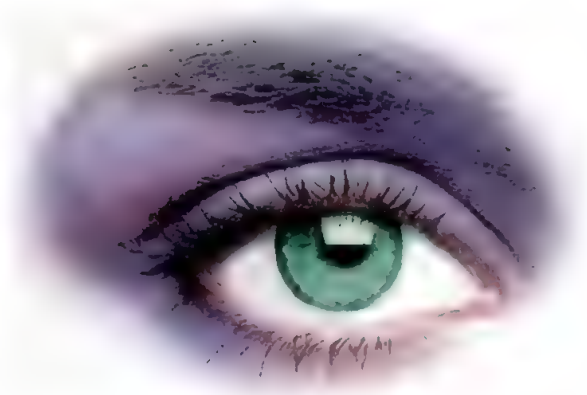
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The Internet Appliance

The hottest topic in computing right now is the so-called Internet appliance. Since I first mentioned that many in the industry were talking about the possibility of a sub-\$500 machine specifically designed for Internet browsing (see "Is the PC Irrel-

evant?" December 5, 1995), I've received loads of letters and e-mail from readers wanting to know more. And it seems as if the subject comes up in every meeting I have with anyone who makes PCs or networking-based software.

The basic questions people ask are: Will people buy such a device? Will it replace the PC? Can anyone build it?

The answers to these questions depend on your definition of the proposed terminal. As described by Oracle's Larry Ellison, an Internet appliance is an inexpensive machine designed primarily for browsing the World-Wide Web. It would not have to be based on standard PC technology. Indeed, half of the appeal for companies like Apple, Oracle, and Sun seems to be in the assumption that it wouldn't have an Intel chip and it would not run Windows.

Well, okay. As I've said before, I do think there is a market for such a device, whether you call it an Internet terminal, NC (network computer), or IPC (interpersonal computer) as IBM's Louis Gerstner referred to it in his Comdex address.

For many places such as schools or libraries, mainstream PCs are too expensive. I can see banks of internet appliances used at those places for research, education, or just plain browsing. Such devices would bring the Internet within reach of lots of people. Even among PC users, I suspect there's a market for secondary machines permanently connected to the Net. Finally, within organizations, there are many applications that effectively use terminals with all the information on the server.

But will the Internet appliance replace the current PC? Not a chance. Most PC users will continue to want local applications and local data. Most users have their own personalized data and don't want to store all of it on a central server, even if that is possible, efficient, and secure. Your hard disk is likely to be much faster than any network connection, at least for the foreseeable future.

More important, the PC is likely to remain faster and far more flexible. Today's PC can be used for an amazing variety of things from word processing and spreadsheets to



NET TERMINALS

Such devices would bring the Internet within reach of lots of people. Will it replace the PC? Not a chance.

games to Internet access to video conferencing. That's why PCs succeeded even when they were more expensive than dedicated word processors. And that's also why I don't think their growth will be hampered by the advent of Internet terminals.

But given that I do think there is a market for such terminals, what are the chances we'll see such a device in 1996? Again, it depends on what you mean. The original description was a complete box with Internet access, 4MB of RAM, 4MB of flash memory, processor, monitor, keyboard, and mouse—all for under \$500. From a pure cost standpoint, that won't happen this year, and certainly not with the monitor and 8MB of RAM I think may be needed. I do believe we might see such a device including a monitor for under \$1,000 by the end of the year, but that's not much cheaper than a low-end PC.

That said, we might well see a lower-cost unit with different specifications. You could certainly build a terminal without any real processor for \$500 and do all the processing on a central server. According to that model, you make money selling the server and its software. This will work

in some settings, particularly as an alternative to existing server-based platforms, but it's no replacement for the PC.

Another way to get these devices into homes for less than \$500 apiece would be to follow the example of the cellular telephone business. You can buy a cell phone today for almost nothing if you sign up for a service plan. So if you're willing to agree to pay at least \$50 a month for 3 years, my guess is that an Internet provider will sell you the machine for less than it costs to build.

The bottom line: The Internet appliance won't replace the traditional PC, but it may use PC technology to bring the on-line world to a broader audience. My guess is that sometime in the future, we'll have lots of different devices in our homes and businesses that are really PCs. Some will look like traditional PCs, and some will be very different. All will be connected in some way. The Internet appliance is a step toward that future. □

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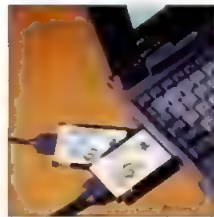
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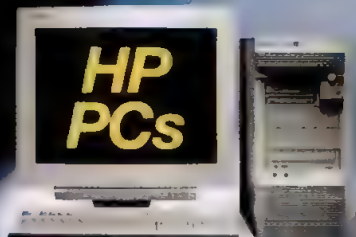
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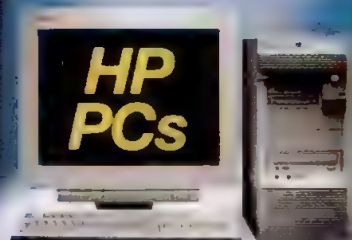
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SoftRAM Under Scrutiny

PC Magazine Labs tests show no compression gains.

Synchronys Softcorp's top-selling SoftRAM 95—which the company touts as a “RAM-doubling and resource expansion” product—does not compress memory or increase system resources under Windows 3.x in PC Magazine Labs’ testing. The company, which has sold over 700,000 copies

of the \$29 program, has already stated that SoftRAM 95 does not compress memory under Windows 95 on a consistent basis.

As part of a comprehensive evaluation of memory utilities that will appear in the PC Tech section of our issue of February 20, 1996, PC Magazine Labs tested SoftRAM 95, Quarterdeck’s MagnaRAM2 and QEMM 8, Helix Software’s Hurricane, and Connectix Corp.’s RAM Doubler on a variety of systems and processors (ranging from a 33-MHz 486 with 4MB of RAM to a 133-MHz Pentium with 16MB of RAM) and performed a technical analysis of the programs’ code.

We ran a long application script to measure performance and impact on Windows’ ability to load many large applications. The script involves loading numerous applications and performing various operations such as file loading and printing. Along the way, we timed operations and measured the amount of system resources available.

SoftRAM 95 did not enable us to load any more applications than Windows did on its own. Throughout the course of the test, the amount of free system resources was about the same with SoftRAM 95 loaded as without it.

While the program may enable you to load more applications, this is only because it expands the size

of temporary swap files and increases the SYSTEM.INI’s PageOverCommit setting from 4 to 10. But you can set both of these features in Windows 3.1 on your own without purchasing additional software.

During testing, SoftRAM 95’s Gauge utility indicated that the program was compressing RAM and expanding system resources—but other indications were to the contrary. After PC Labs installed SoftRAM 95 on a system that had 85



Roll Your Own Web Browser

Just drop in an object.

With over 30 competing Web browsers available at last count, it’s a little late to start writing your own. But there are plenty of reasons why you’d want to add Web browser functionality to applications you develop yourself—especially if you’re building intranet applications to be used on private Web servers within an organization. These applications are the hottest trend in corporate information technology.

For developers, adding a Web browser or other Internet functionality can be as simple as drag-

Top Retail Software

- 1 **MS Windows 95 Upgrade** Microsoft
- 2 **SoftRAM 95** Synchronys Softcorp
- 3 **MS Plus! for Windows 95** Microsoft
- 4 **Norton Antivirus for Windows 95** Symantec
- 5 **Uninstaller** Microhelp
- 6 **Netscape Navigator** Netscape Communications
- 7 **Norton Utilities for Windows 95 Upgrade** Symantec
- 8 **Norton Antivirus for Windows 95 Upgrade** Symantec
- 9 **WordPerfect for Windows Upgrade** Novell
- 10 **VirusScan** McAfee Associates

Source: Data for October

percent of its resources free with no applications loaded, the resources indicator detected 80 percent free resources without SoftRAM 95 and 85 percent with it. Informed of PC Labs’ test re-

sults, Synchronys said that the Gauge program produces only a projection. At press time, the company maintained that the program does perform compression.—Larry Seltzer

ging and dropping any one of a number of new OLE custom controls (OCXs) into a project.

The Webster Control, from Sax Software (503-344-2235), offers a complete prebuilt Web browser that comes with the standard Web navigation features and up-to-date HTML table support. A series of Web-centric events like DoClickURL let your code respond to Web surfer activity such as clicking on a hyperlink.

Web Widgets, from V_Graph (800-852-6284), is a collection of two controls, including a complete HTML 2.0-compatible browser and an HTTP control for uploading and downloading files in the background. The latter feature is useful for creating server

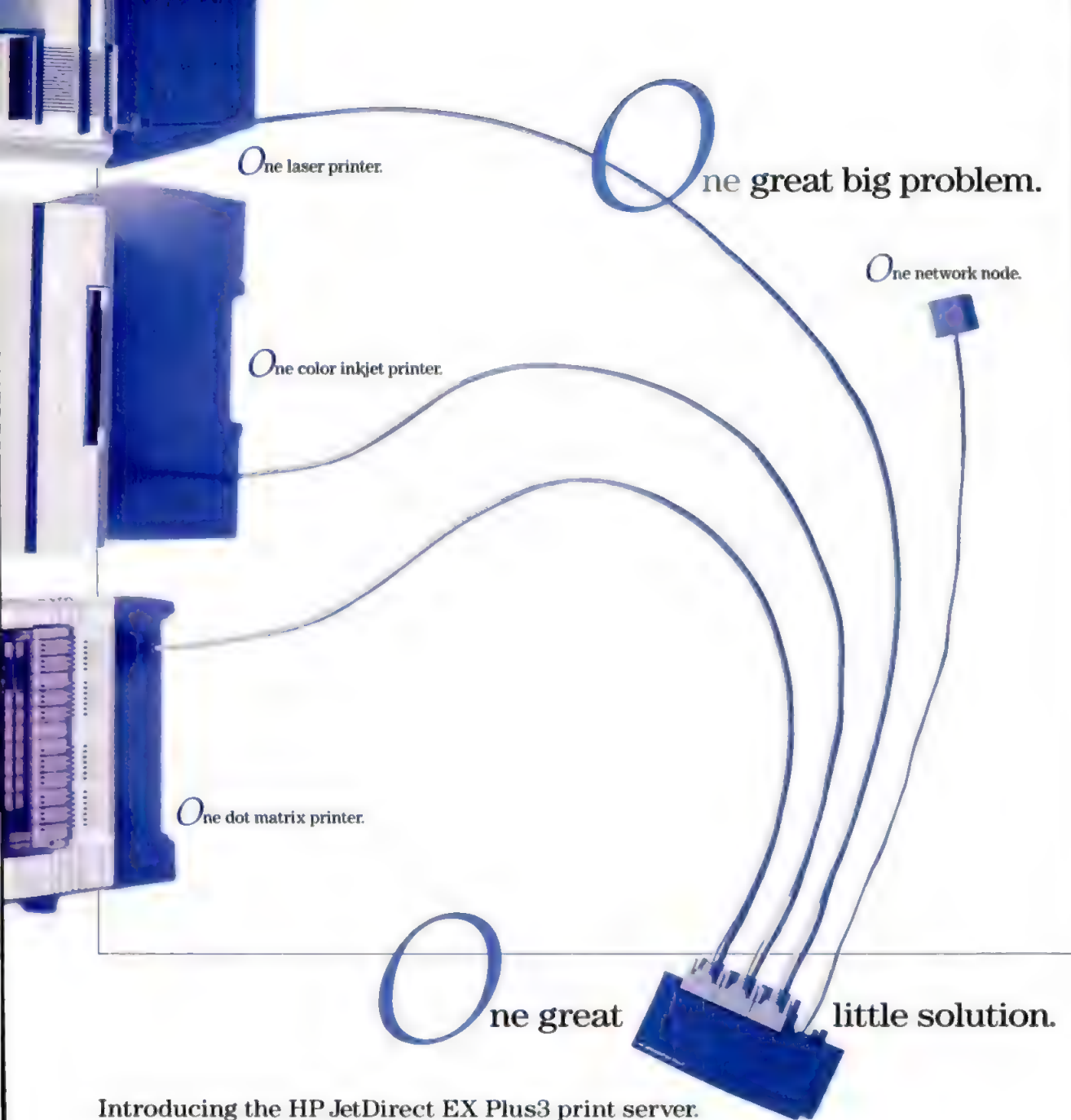
maintenance applications or kiosk applications that update automatically.

The Distinct TCP/IP SDK—Visual Edition, from Distinct Corp. (408-366-8933), provides a set of OLE custom controls for developing TCP/IP applications. And NetManage (408-973-7171) has announced the Chameleon Internet Software Developers Kit, which will include controls for adding Windows Sockets 1.1, Secure Sockets, FTP, a news reader client, SMTP, POP3, HTTP, and HTML 2.0+ to your applications. Now that development tools are available for plugging Web access directly into applications, a wave of Web-enabled corporate applications can’t be far behind.

—Thomas Mace



COMIC RELEASE: Even Dilbert is getting into the Web browser act.



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NOS Compatibility: Novell NetWare; Microsoft® Windows™ 95, Windows NT, Windows for Workgroups, LAN Manager; IBM LAN Server; UNIX®: HP-UX, SunOS, Solaris, IBM AIX, SCO UNIX, Ipd; Apple Ethertalk

Management Support: HP JetAdmin print management software enables consistent installation and management of any HP JetDirect connected printer on the network;

supports SNMP-based network management software

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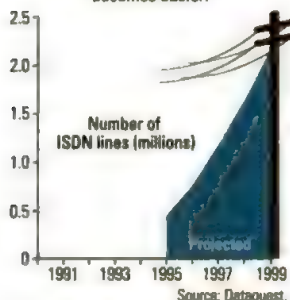
ISDN Heats Up

Public digital networks are finally hitting it big.

With new products aimed at a mass market and new promotions by regional telephone companies, ISDN is set to become the widespread data communications standard of the nineties. ISDN can provide data and voice transmission speeds of up to 128 Kbps (compared with a 28.8-Kbps uncom-

ISDN on the Fast Track

Businesses and homes are moving to ISDN as the cost drops and setup becomes easier.



pressed speed over analog phone lines). It has gained ground recently, thanks to increased telecommuting and demand for high-speed Internet access.

According to Dataquest, ISDN subscriber lines are projected to increase from 448,000 in

1995 to 758,000 in 1996—exceeding 2 million by 1999. “ISDN now has been deployed to the point where companies are seeing they can get the access that they need,” says John Coons, director and principal for wide-area networking research at market research firm Dataquest.

In fact, beginning with this issue of *PC Magazine*, the Trends section is being transmitted via ISDN directly to our printers. “You’re seeing many companies using ISDN to deliver documents that they used to ship using an overnight courier,” says Coons.

Telephone companies and ISDN adapter vendors are primed to meet the demand. And they’re not just going after the traditional corporate customer: Low-cost, consumer-oriented ISDN modems such as Motorola’s BitSurfr and 3Com’s Impact hit retail outlets last year. And U.S. Robotics has teamed up with Bell Atlantic to sell a co-branded product, the Sportster ISDN 128K.

To eliminate what have been painful and frustrating ISDN installation problems, telcos such as Ameritech, BellSouth, and Southwestern Bell are reselling turnkey ISDN solutions with products from companies including Ascend Communications, Cisco Systems, and Gan-

PC Magazine Online Events



WWW.PCMAG.COM, *PC Magazine*’s ever-growing home page on the World-Wide Web, is the place to go to read articles from the current newsstand issue as well as special reports, news flashes, and opinion columns that appear nowhere else. **Trends Online** and **NewsWatch** provide up-to-date analyses of industry developments and daily news briefs from the world of computing. The **Product of the Week** takes an interactive first look at some of the hottest products on the market. The weekly discussion culminates in a live chat with company representatives and *PC Magazine Labs* staff. You can also read our weekly columns: On Mondays, it’s **John C. Dvorak** with his outrageous opinions; on Tuesdays, **Michael J. Miller** answers your questions; on Wednesdays, **Don Willmott** takes an idiosyncratic look at the Web; and on Fridays, wind down with **Web Getaways**.

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dalf Technologies. For between \$500 and \$600, you can get a complete installation—right down to the digital adapter in your desktop PC.

In the short term, ISDN will remain the darling of speed-snob hobbyists and remote corporate

users. But that will change as the cost of ISDN services and adapters continue to drop (special offers can mean service for as low as \$30 per month, and adapters for as little as \$399), and more customers find ISDN worth their while. —*Todd Spangler*

Software for a Billion People

Handwriting recognition aims to open PC market in China.

In China, a handwritten business letter is an accepted form of communication, and since it’s rare for college students to own PCs, they write their papers by hand. It’s no wonder: Good typists need to memorize thousands of key sequences. Handwriting recognition would seem to be a natural solution, but the complexity of the Chinese language is a technical challenge for software engineers.

Despite the difficulty of entering the 13,000 Chinese characters on a standard keyboard, the PC market in China is booming. Last year, one million PCs were sold in the country. That’s not many when compared to sales figures in the U.S., but the Chinese market is growing at a phenomenal rate.

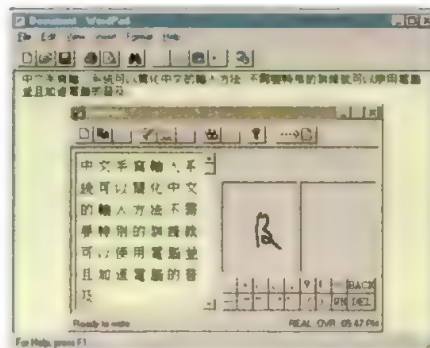
“In most of Asia today, PCs are starting to move beyond the technocratic elite,” says Derek Ling of the Asian business development group at Motorola’s Lexicus division, which was formed in 1992 to develop “natural interfaces.” Ling is part of an international corps of developers based in Beijing, Hong Kong, Singapore, and California who are working on a handwriting recognition application called LexiPen that

could bring even more PCs to China’s mass market.

“There’s a technical opportunity with Chinese that doesn’t exist in English,” says Ling. Since entering Chinese characters using a standard keyboard is an arduous and complicated task, Motorola engineers contend that pen input may eventually replace the keyboard in China.

LexiPen applies writing models to each Chinese character, written with a series of up to 18 strokes that can run together. According to Motorola, the recognition engine is about 95 percent accurate.

This isn’t the first attempt to solve the problem. In the early 1980s, Wang and IBM developed a numeric code system that required a substantial amount of training. —*Carol Levin*



CHARACTER DEVELOPMENT: Motorola’s LexiPen recognizes 13,000 Chinese characters.

By Jake Kirchner

Living with Windows 95

Four months ago in this space I asked the questions: Did Microsoft's extensive beta program for Windows 95 pay off? Did it deliver a solid product—meaning the launch version wouldn't have to be followed promptly by an extensive bug-fix release? Was it worth the time and trouble to develop and manage a beta-testing program of 50,000 sites and get pre-release software into the hands of 1 million users?

Today, the short answer to all those questions is yes.

By the end of the year, it was clear that the company used the additional months—all nine of them—of development time profitably, at least in terms of the quality of the finished product. Having placed an estimated 7 million copies under what Microsoft's Brad Silverberg termed the "microscope of widespread use" in the first several months, the company let out a collective sigh of relief. The word from Redmond: Don't expect to see a Windows 95 Version 1.01.

Microsoft has made available a half-dozen bug fixes on-line and will soon be rolling out enhancements such as drivers for NetWare Directory Services and IRDA. An upgraded Explorer will follow as well. But Silverberg, senior vice president of Microsoft's personal systems division and the person responsible for Windows 95 development, says that these actions, and the continuing delivery of further enhancements, are more natural evolutionary steps than fixes.

In truth, although it's hard to scratch a knowledgeable Windows 95 user without uncovering a complaint about at least one feature



The word from the folks in Redmond: Don't expect to see a Windows 95 Version 1.01.

or the lack thereof, I haven't come across anyone who claims the operating system plain doesn't work or is buggy in any significant way.

After using several of the beta versions, I've run the final version of Windows 95 on six different PCs with a wide range of application software. I still find some of the new features disconcerting, but the operating system hasn't blown up on any of my machines.

Silverberg said surveys have found that more than 90 percent of early users were pleased with the product. Obviously, the remaining not-as-pleased 10 percent constitutes a sizable group of possibly disgruntled users. But with the average support caller now on hold less than 30 seconds, it appears that the company has soothed much of the early implementers' pain.

"The quality of the product is a real testament to the beta program," Silverberg said, adding with a tone more of conviction than relief: "The beta testing process worked; it really worked. I don't think people really expected it to come out as clean as it did."

Of course, no operating system is considered a success unless it attracts sufficient hardware and software from other vendors. So perhaps the most significant accomplishment of Windows 95 has been that in the first two months alone, 2,000 hardware and software products earned the right to sport logos indicating they were designed for use with Windows 95.

Giving credit where credit is due, I'd say the Windows 95 megaprogram was a success.

Virtual Playground Takes On-Line Worlds to Next Level

Spielberg and Schwarzkopf debut StarBright World.

I do not plan to lose this battle. I can assure you that," declared General Norman Schwarzkopf, chief fundraiser for the StarBright Foundation, a nonprofit collaboration of the healthcare, technology, and entertainment industries that has developed an on-line service of sorts where hospitalized children from around the world can hang out, horse around, and heal.

The project is no small undertaking. Sprint is supplying the high-bandwidth T-3 transmission lines; Intel is supplying the StarStations (Pentium-based PCs outfitted with ProShare video conferencing systems); and

Worlds Inc. is developing the virtual playgrounds where kids can escape the confines of a hospital and explore on-line environments through their animated avatars. UB Networks is supplying the ATM and Ethernet routers and switches. And Steven Spielberg is contributing not only his name, but also his creative vision and the talents of artists from his animation company who will create made-to-order avatars.

At the premiere of StarBright World in November, General Schwarzkopf and his young partner, a patient at Mount Sinai Medical Center in New York, took up positions before a StarStation. To-



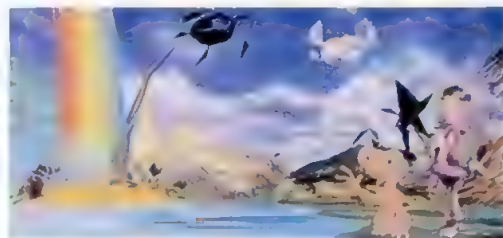
gether they had command and control of their avatar, a whimsical bear. Spielberg and his young cohort chose E.T. as their avatar. Together, the two characters explored Tropical World,

then ventured into Cave World, where they met up with a flying pony and a green car controlled by young beta testers at hospitals in Boston and Palo Alto, California.

"This isn't just fancy playtime," explains Dr. John Rowe, CEO of Mount Sinai Medical Center. In fact, participating in such activities has been shown to decrease the

amount of pain medication children need. StarBright advisors are evaluating how linking kids through StarBright World might provide relief from loneliness, pain, and stress. A second study will assess the project's impact on self-esteem and coping behaviors.

The first fleet of 100 StarStations are being tested in seven hospitals in the U.S. By the end of the three-year beta program, StarBright hopes to link kids around the world.—Carol Levin



FUN IN CYBERSPACE: Kids use an avatar to play with other kids inside StarBright World's virtual spaces.

STORY TELLING.



TELLING STORY.

Two independent labs proved the U.S. Robotics Sportster V.34 modem outperforms the leading external 28.8 modems. That's not hype. It's fact. And it's what we and our customers have known all along.

TeleQuality Associates and Henderson Communications Laboratories put today's popular 28,800 bps V.34 modems up against the Sportster. And guess what – the Sportster outperformed them all.

SPORTSTER SUPERIOR IN CONNECTING AT OPTIMUM SPEEDS.

The Sportster achieved the highest connect success rate scores, demonstrating a consistent ability to connect at top speeds. The differences were dramatic, with some brands connecting only 40% as often!



SPORTSTER PROVED BEST IN COMPATIBILITY.

Paired in every possible combination, the Sportster with True V.34™ topped them all in test after test. In fact, the Sportster proved more compatible with several of the other brands than those modems were with their own brand.

SPORTSTER TOPS IN THROUGHPUT, TOO.

Even under the widest array of line conditions, U.S. Robotics Sportster came in first, delivering up to 177% more data. Which makes the bottom line simple: If you're in the market for a V.34 modem, you can listen to a lot of stories. Or you can check out the facts. Call us for a summary report on the test methodology and findings.

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You can also reach us at: sales@usr.com support@usr.com <http://www.usr.com>



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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

PCs

166-MHz Pentium PCs: Fast-Lane Computing

By John Morris and Brian Nadel

Even as the Pentium Pro processor establishes itself as the processor of choice for workstations, the tried-and-true Pentium design is expected to dominate the mainstream computing landscape during 1996.

These first six Pentium/166 systems are high-end in every respect, sell for less than \$4,500, and offer a 35-percent performance improvement over the average 100-MHz Pentium system ("In Like a Lion...," December 5, 1995).

There are many similarities among the six systems: Each uses a motherboard running at 66 MHz and a PCI bus running at 33 MHz and is based on the most up-to-date peripherals. Yet each system has its own audience. Dell's Dimension XPS P166c was the performance leader, while the Gateway 2000 P5-166 includes an Altec Lansing three-speaker set. The Micron P166 Millennia Plus had the most advanced hard disk subsystem and the IBM PC350 was the least expensive but trailed the group in terms of performance. The CLR Infinity P5-166EDO, which came with 32MB of RAM,

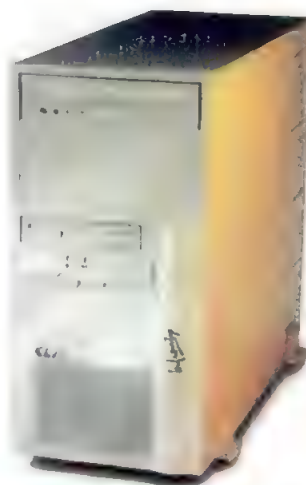
was the choice for memory-intensive tasks.

With even faster Pentium CPUs on the way, it is clear that the 166-MHz Pentium CPU will soon be eclipsed. But for now, it is the fastest route to desktop power.

CLR INFINITY P5-166EDO

The latest French import is neither a Pierre Cardin suit nor a bottle of Bordeaux, but Compu-Link's \$3,699 P5-166EDO PC. The P5-166EDO we tested had many unexpected extras and produced evenhanded though not spectacular performance results.

The Pentium/166 system uses a



MULTITASKING MACHINE: The CLR Infinity P5-166EDO was the only system with 32MB of RAM.

Triton-based motherboard with 32MB of EDO memory and 256K of external cache. There's a Western Digital Caviar Enhanced IDE 1.6GB hard disk and a 6X CD-

ROM. Sight and sound are taken care of by the system's PCI graphics card, which uses S3's 868 chip with 2MB of EDO memory, a Creative Labs Vibra 16 audio card, a pair of Labtec speakers, and a superb Hyundai 17-inch monitor. The mini-tower case has room for three PCI slots, two ISA slots, and one shared expansion slot.

Tested with 16MB of RAM, the Infinity P5-166EDO was slightly off the blistering pace set by the Dimension XPS P166c on our benchmark tests. The Infinity P5-166EDO's scores of 66.7 on our Winstone 96 tests and 21.6 million pixels per second on our Graphics WinMark 96 tests were slightly below the average for this group of six Pentium/166 PCs.

The value difference is that the system's \$3,699 price tag includes 32MB of RAM, rather than the 16MB included on the other sys-

Continues on page 40

DESKTOP PUBLISHING

PageMaker 6.0 Moves to Windows 95 and Adds Color Management Along the Way

By Luisa Simone

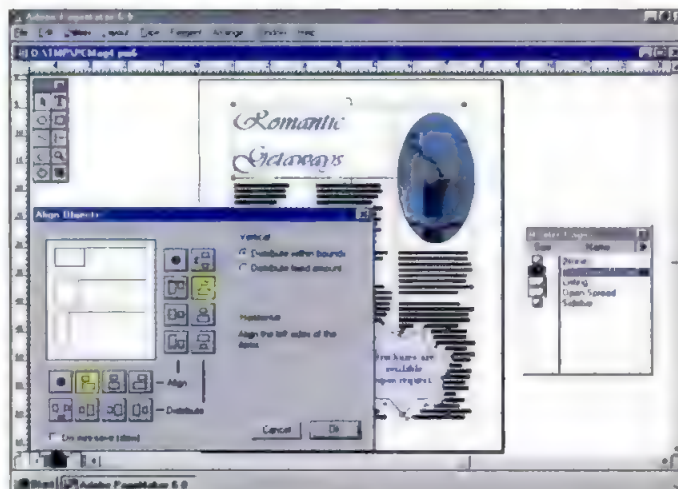
With the addition of color management and electronic publishing tools, Adobe PageMaker 6.0 for Windows 95 has thrown down the gauntlet to QuarkXPress. Professional publishers interested in using Windows 95 or Windows NT will love the \$895 program because it allows them to branch out from traditional CMYK printing into cutting-edge color and on-line documents.

PageMaker makes the jump to a 32-bit world with almost 100-

percent compliance. It supports Windows 95, Windows NT, OLE 2.0, long filenames, and e-mail via MAPI. On the other hand, PageMaker doesn't use the right-

mouse button to bring up an object-properties sheet; instead, the right mouse retains the familiar zooming function. You can install

Continues on page 42



IN FIRST LOOKS

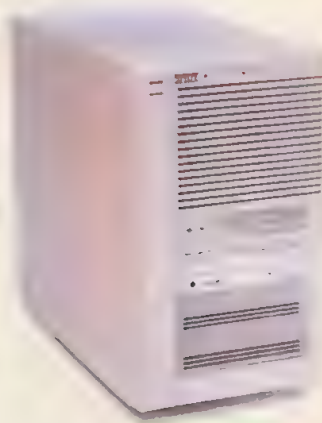
Logitech PageScan Color	43
First Aid 95	44
SmartDraw Pro 2.02	44
Clear Process 1.0	46
MacOpener 1.0	46
Windows 95 Utilities	50
Apple PowerBook 5300c/100	54
ChromaZone	54
Boxlight Multibook C300	56
Visual Reality 2.0	60
3-D/EYE TriSpectives 1.0	60
DecideRight 1.0	63
Which & Why 3.11	63

FRONT-END ALIGNMENT: New PageMaker layout tools include alignment and distribution functions, user-defined polygon shapes, multiple master-page layouts, and the ability to mask imported pictures.

PENTIUM PCs IN A VARIETY OF SHAPES AND SIZES

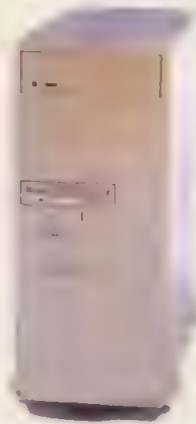


COMPACT COMPUTING: The IBM PC350 packs Pentium/166 power and solid peripherals into a desktop case.



HEAD OVER HEELS: The Digital Celebris GL 5166's external bays rotate.

PENTIUM POWERHOUSE: With 512K of external cache, the Dell Dimension XPS P166c sets a new performance standard.



Pentium/166 PCs

Continued from page 39

tems tested in this miniroundup. If you're interested in nearly top-flight performance at a good price, the CLR Infinity P5-166EDO delivers.—*BN*

CLR Infinity P5-166EDO. List price: With Pentium/166 CPU, 32MB RAM, 256K external cache, 1.6GB hard disk, 6X CD-ROM, 17-inch monitor, \$3,699. Compu-Link Research Inc., Miramar, FL; 800-611-1555, 305-450-7061; fax, 305-450-7062. Circle 429 on reader service card.

DIMENSION XPS P166c

The \$3,899 XPS P166c is the latest member of Dell's Dimension XPS line, which has garnered several Editors' Choice awards. Boosted by 512K of external cache and top-of-the-line graphics capabilities, the Dimension XPS P166c is the current performance and value leader.

The Dimension XPS P166c comes with 512K of external cache, twice that of the other systems we tested. The system is based on an Intel-made motherboard that uses the Triton chip set and comes with 16MB of EDO RAM and a 1GB Quantum Fireball hard disk. Both the hard disk and the 6X CD-ROM drive use

the system's Enhanced IDE controller. Inside the mini-tower case, the motherboard has three PCI and three ISA expansion slots, as well as one shared connector.

The Dimension XPS P166c comes with Number Nine Technologies' Imagine128 video card with 4MB of VRAM and led this group in terms of graphics performance with a Graphics WinMark 96 result of 32.1 million pixels per second—the highest score we've seen so far.

The Dimension XPS P166c's 74.9 was the best Winstone 96 result, edging out the P5-166's 74.8. Only the Fast SCSI-based P166 Millennia Plus kept the Dimension XPS P166c from a clean sweep of the benchmark test results by grabbing top honors on the Disk WinMark 96 tests.

The Dimension XPS P166c makes the most of Intel's 166-MHz Pentium processor at a competitive price and stands as the system to beat.—*JM*

Dimension XPS P166c. Estimated street price: With Pentium/166 CPU, 16MB RAM, 512K external cache, 1GB hard disk, 6X CD-ROM, 17-inch monitor, \$3,899. Dell Computer Corp., Austin, TX; 800-289-3355, 512-728-3653; fax, 800-727-8320. Circle 430 on reader service card.

DIGITAL CELEBRIS GL 5166

Digital Equipment Corp.'s \$5,098 Celebris GL 5166 is one of today's best-equipped, integrated, and flexible PCs. This system's motherboard is a marvel of integration with everything you'll need, from video to audio to SCSI to networking.

The system uses a Triton-based motherboard that comes with 16MB of RAM and 256K of external cache. Mass data storage is handled by an Enhanced IDE 1.6GB Western Digital Caviar hard disk and a quad-speed CD-ROM drive. The motherboard also contains 10Base-T Ethernet circuitry as well as a PCI-based SCSI chip.

The Celebris GL 5166's case leads a double life; the external bays rotate so that it works just as well in desktop or mini-tower orientation. The price for this flexibility is that the case is a few inches wider than that of other mini-towers. Inside, there's room for a pair of shared PCI/ISA expansion cards as well as two ISA cards. Audio is handled by an ESS 1688 chip on the motherboard and a pair of Labtec speakers. There's also a motherboard-integrated Matrox Millennium graphics accelerator chip with 2MB of WRAM.

On all of our benchmark tests, the Celebris GL 5166 was an average performer for the group of Pentium/166 PCs. The system's

Winstone 96 score of 68.1 was about 30 percent higher than that earned by the average Pentium/100 PC.

Integration and flexibility are the strong suits of the Digital Celebris GL 5166; performance leaves a little to be desired.—*BN*

Digital Celebris GL 5166. List price: With Pentium/166 CPU, 16MB RAM, 256K external cache, 1.6GB hard disk, quad-speed CD-ROM, 17-inch monitor, \$5,098. Digital Equipment Corp., Maynard, MA; 800-344-4825; <http://www.pc.digital.com>. Circle 431 on reader service card.

GATEWAY 2000 P5-166

The \$3,999 Gateway 2000 P5-166 is a very flexible high-performance system that should appeal to a wide variety of users.

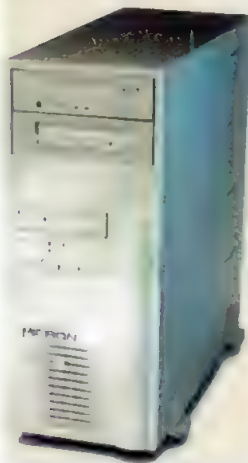
The P5-166 we tested is based on an Intel-made ATX motherboard that uses the Triton chip set; it comes with 256K of external cache (Gateway will start shipping the system with 512K of cache) and has three PCI and two ISA expansion slots, plus a shared connector. The system ships with 16MB of EDO RAM and an Enhanced IDE 1.6GB Western Digital Caviar hard disk.

The system includes a PCI-based Matrox Millennium video card with 4MB of WRAM, a 17-inch monitor,

First Looks

STORAGE SOLUTIONS:

The Micron P166 Millennium Plus is equipped with a 2GB Fast SCSI hard disk.



SOUND SYSTEM: The Gateway 2000 P5-166 comes with a set of three Altec Lansing speakers.

and a Wearnes 6X CD-ROM drive. In addition to the Ensoniq wavetable sound card, the P5-166 includes a trio of Altec Lansing speakers. The P5-166 was able to produce richer sound than the other P/166 systems. A bonus is the included U.S. Robotics Sportster V34 data/fax modem.

On our Winstone 96 tests, the P5-166's score of 74.8 was only slightly behind that of the Dimension XPS P166c. The unit's other scores, such as those on the CPUmark₁₆ and CPUmark₃₂ tests, were in the middle of the pack.

The Gateway 2000 P5-166 offers the power of a leading-edge PC with the features of a capable multimedia system.—JM

Gateway 2000 P5-166. List price: With Pentium/166 CPU, 16MB RAM, 512K external cache, 1.6GB hard disk, 6X CD-ROM, 17-inch monitor, \$3,999. Gateway 2000 Inc., No. Sioux City, SD; 800-846-2000, 605-232-2000; fax, 605-232-2023. Circle 432 on reader service card.

IBM PC350

The IBM PC350, which has an estimated street price of \$3,500, has squeezed some solid components into the system's case, but the unit's performance was midrange.

Based on an Intel motherboard and Triton chip set, the PC350 comes equipped with 16MB of

EDO RAM and 256K of external cache. The system uses an Enhanced IDE controller connected to a 1GB Quantum Fireball hard disk and a 6X CD-ROM drive.

Because of its desktop configuration, the PC350 has only one free external bay and has the most compact case of the six P/166 units we reviewed. The PC350 also has fewer slots inside: a total of two shared PCI and three ISA connectors.

The system we tested had a Matrox Millennium graphics card with 4MB of WRAM and an IBM 17-inch monitor. For audio, the PC350 offers a Creative Labs Sound Blaster AWE32 sound

card, with FM and wavetable synthesis and a pair of S3 speakers.

In lieu of Windows 95, the PC350 ships with Windows 3.11 and OS/2 Warp. On our Winstone 96 tests, the PC350's score of 62.6 was the lowest among the Pentium/166 systems we tested and was only slightly better than the 60.2 mark earned by the Micron P150 Millennium. With the assistance of the Matrox Millennium card, it fared better on the Graphics WinMark 96 tests, yielding a score of 26.6 million pixels per second.

Despite its less-than-stellar performance, the IBM PC350 will put Pentium/166 technology on your desktop at a nice price.—JM

IBM PC350. Estimated street price: With Pentium/166 CPU, 16MB RAM, 256K external cache, 1GB hard disk, 6X CD-ROM, 17-inch monitor, \$3,500. IBM Personal Computer Co., Research Triangle Park, NC; 800-462-2968, 919-517-1331. Circle 433 on reader service card.

MICRON P166 MILLENNIA PLUS

Micron Electronics' \$4,446 P166 Millennium Plus comes with a cutting-edge video board and the most advanced hard disk of the group.

The P166 Millennium Plus comes in a mini-tower case and uses a Micronics motherboard with Intel's Triton chip set, 16MB of EDO RAM, and 256K of external cache. The P166 Millennium Plus boasts an advanced BusLogic Fast SCSI controller connected to the unit's

2GB Quantum Grand Prix hard disk and a Plector 6X CD-ROM drive. The P166 Millennium Plus was the only system with an internal Iomega Jaz drive, which accepts 1GB cartridges.

Multimedia-ready, the P166 Millennium Plus is equipped with an Editors' Choice-winning Diamond Stealth64 video card with 2MB of VRAM, a Creative Labs Sound Blaster AWE32 audio board, and Advent AV270 speakers.

The Pentium/166 system produced solid but not outstanding scores on our benchmark tests. Its Winstone 96 score of 68.7 and CPUmark₁₆ and CPUmark₃₂ results of 304 and 313, respectively, make it a slightly above-average performer. Not surprisingly, the P166 Millennium Plus, with its Fast SCSI hard disk, notched the top score of 1,210 on our Disk WinMark 96 tests. We also tested the Micron P150 Millennium, which includes a Pentium/150 CPU but not the Fast SCSI subsystem and sells for \$3,047. Its Winstone 96 score of 60.2 was just behind that of the PC350.

The P166 Millennium Plus mixes solid performance with high-end components.—BN

Micron P166 Millennium Plus. List price: With Pentium/166 CPU, 16MB RAM, 256K external cache, 2GB hard disk, 6X CD-ROM, 17-inch monitor, \$4,446. Micron Electronics Inc., Nampa, ID; 800-388-6334, 208-893-3514; fax, 208-465-8990. Circle 434 on reader service card.

BENCHMARK TESTS



Pentium/166 Desktop PCs

The Dell Dimension XPS P166c earned the best score on four out of five benchmark test suites and was the best performer of the group. The Gateway 2000 P5-166, with its second-best Winstone 96 score, was close behind. The Micron P166 Millennium Plus's Fast SCSI host adapter and hard disk combined for the top

Disk WinMark 96 score.

To measure the performance of these systems, we used Winstone 96, Version 1.0, and WinBench 96, Version 1.0. Each tested system was equipped with 16MB of RAM. The IBM PC350 was running Microsoft Windows 3.11, while the other systems ran Windows 95.

Higher scores represent better performance. Red type denotes first place.

	Winstone 96	Graphics WinMark 96 (Mpixels/sec)	Disk WinMark 96	CPUmark ₁₆	CPUmark ₃₂
CLR Infinity P5-166EDO	66.7	21.2	1,050	308	302
Dell Dimension XPS P166c	74.9	32.1	1,190	323	330
Digital Celebris GL5166	68.1	24.4	1,000	291	281
Gateway 2000 P5-166	74.8	27.3	1,060	303	300
IBM PC350	62.6	26.6	1,090	290	276
Micron P166 Millennium Plus	68.7	24.4	1,210	304	313
Average P/166 desktop PC (Dec. 5, 1995)	51.5	15.9	872	203	205

First Looks

PageMaker

Continued from page 39

the program on Windows 3.1 systems because it includes the required Win 32s .DLLs (and the old Table Editor) for a 16-bit operating system.

The program provides several new key features. For traditional paper-based publishing, there's a sophisticated color management system (CMS) and support for HiFi (high fidelity) separations. For on-line publishing, the program adds the ability to output files as Adobe Acrobat .PDF portable documents.

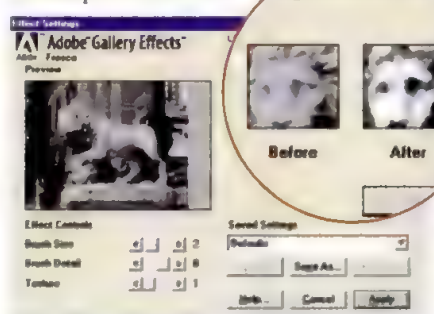
Surprisingly, though Windows 95 is built around Microsoft's ICM (Image Color Matching) engine and ICC (International Color Consortium) device profiles, PageMaker relies on Kodak's Precision CMS and PT (Precision Transform) profiles. The Kodak CMS profiles let you generate RGB-to-CMYK separations from within PageMaker; you can also generate more accurate screen previews of the final printed project by simulating the gamut of either your proofing or your separation printer. Because the Kodak PT profiles have been around for some time, the chances are good that you'll find an appropriate device profile for your hardware devices.

On the downside, relying on the Kodak PT profiles means the current version of PageMaker can't take advantage of Windows 95's built-in ICC profiles. Adobe plans to open the program to third-party color management engines—and with that, to ICC profiles.

PageMaker now supports Pantone's Hexachrome color model, which supplements cyan, magenta, yellow, and black with bright orange and bright green for six-color HiFi presses. Our tests of the hexachrome separations proved that they do a great job on imported and internally created color images. If you include black type and gray-scale images, though, you'll need to define them as hexachrome black; we noticed these images printed too dark and were posterized.

PageMaker broadens the scope of your publishing efforts by opening up the world of electronic documents and the Internet. Using PageMaker, you can generate and distribute .PDF files, thanks to the inclusion of both the Acrobat Distiller Personal Edition and the royalty-free Acrobat Reader.

These options meld well



PLUG AND RUN: Support of the Adobe Plug-in specification means that you can apply image-editing effects within PageMaker. The inset shows the fresco filter in use.

with PageMaker's document structure, allowing you to convert tables of contents and index markers easily into hypertext links, for example.

PageMaker even allows you to publish documents on the World-Wide Web by providing a special Adobe Plug-in called HTML Author (the Plug-ins were formerly known as Aldus Additions). PageMaker's HTML Author earns high points for its ability to analyze a file and identify potential HTML violations, such as text that occupies more than one column. Other nifty functions include the ability to map PageMaker styles to standard HTML format, making it easy to convert a print publication into electronic form.

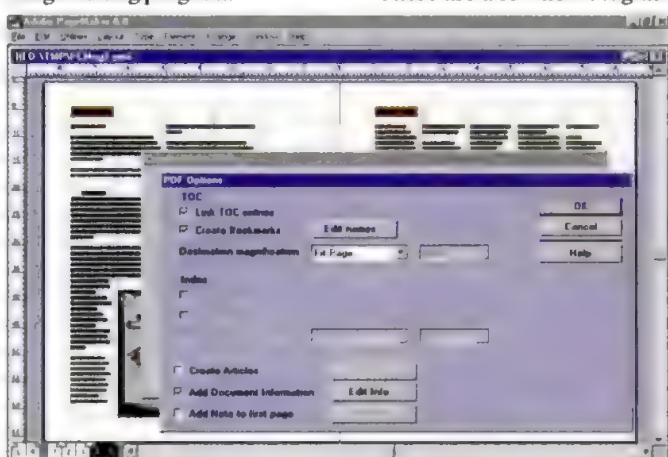
On the other hand, don't expect too much from HTML Author, because it doesn't include browser-specific tags (such as those extensions used by Netscape Navigator) or Web-site management tools. You must still purchase dedicated programs for these functions.

Now that PageMaker is an Adobe product, you would expect a higher level of integration with Adobe protocols and Adobe programs—and you

would be right. For instance, PageMaker now supports the Adobe Plug-in specification, enabling you to use Plug-in filters from within your desktop publishing documents.

Our testing of both the dozen included Gallery Effects filters and of MetaTools (formerly HSC) Convolver was successful on imported TIFF images. The new PhotoCD import filter lets you sharpen, rotate, correct dynamic range, and even interpolate, size, or adjust the resolution of images while placing them.

Particularly impressive is the ability to open a PhotoCD image in the wider gamut of the CIE L*a*b color space—resulting in less of a color shift from the PhotoCD's native YCC format. These are real time-saving features, because you can apply basic corrections and special effects to pictures without exiting to an image-editing program.



PORTABLE PAGES: PageMaker includes the Acrobat Distiller for converting layouts into electronic documents—links and all.

Creating and managing complex layouts is now easier because of several new design tools. Multiple master pages are now available and are limited only by memory. The masters themselves, however, are limited to nonprinting guides and static ob-

jects that repeat on every page. Because PageMaker still doesn't support frames, you can't include empty placeholder text frames on a master page the way you can with QuarkXPress.

You can create any number of different shapes with the new polygon drawing tool, which allows you to define the number of sides and inset points. You can now group objects—even if you don't have a PostScript printer—because the PS Group It Addition has been replaced by a true Group command. You can lock the size and position of elements to protect a portion of a layout from inadvertent changes, align and distribute objects on a page automatically, and even use the internally drawn geometric objects (including the new polygons) to mask imported pictures.

PageMaker has gone through a mild reorganization, resulting in a more logical interface. Many of the Aldus Additions have been integrated more closely with the program. For example, the Sort Pages command is now more logically found on the Layout menu instead of the Utilities menu.

There are a few new Plug-ins

that will prove to be extremely useful. Automatic trapping is now available, and it's customizable. The Publication Converter translates older PageMaker documents into the format used by PageMaker 6.0. And the Guide Manager quickly creates a wide

COLOR SCANNERS

Logitech PageScan: Handy and Quick Desktop Color

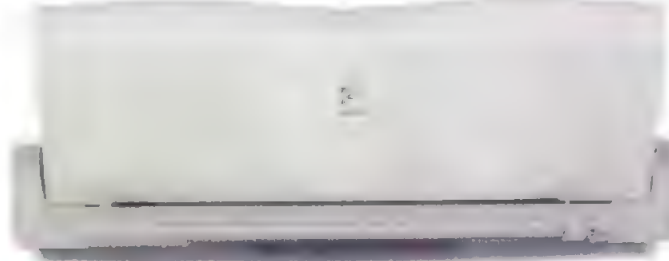
By Alfred Poor

The Logitech PageScan Color is a three-in-one device that combines the convenience of a page-fed personal scanner with the flexibility of a hand scanner and the color features of a flatbed scanner. At \$399, this parallel-port device is an inexpensive way to add a splash of color.

The only major shortcoming is the PageScan's octopus-like set of cables for the power brick, port adapter, and data/power cable.

fax with a fax modem.

Graphics scanning is handled by the PageScan Image Editor. You can cut, crop, and rotate the image, as well as straighten skewed images in small increments. You can also convert images between black-and-white, gray-



QUICK START: Insert a sheet into the PageScan and it automatically starts a scan. Test scans at 200 dpi produced high-quality images (upper right).

There's also a printer pass-through device, but you can't print while you're sending a scan to your PC.

The PageScan's housing is sculpted, and it rests on a 13-inch-wide and 3.5-inch-deep base.

The software installs quickly and easily. The many components are beautifully integrated. The scanner automatically starts the scanning process when you insert a page. The unit then pulls the page past the scanning surface. During our evaluation, the PageScan handled a variety of originals, including business cards, with ease.

Perhaps the most interesting aspect of the PageScan is that it easily converts to a full-page-width hand scanner. Lift the scanner out of its base and place it on a page in a book or magazine. The PageScan does the rest, inching across the page by itself.

The software presents a simple toolbar that lets you pick text or graphics, file, copy to a printer, and if your computer is so equipped,

scale, and color formats. The software supports OLE 2.0, so you can embed scanned images in Windows applications.

The scanner comes with Twain support to scan directly into a variety of programs. You can scan only the entire page—not selected portions—using the Twain driver.

Optical character recognition (OCR) text-conversion is handled by the included Xerox TextBridge OCR. TextBridge includes Xerox's PerfectScan image-enhancement software, which optimizes scans for OCR and includes printer profiles for better reproduction. The character-recognition software preserved most of the fonts and format details and did a good job of handling snaking columns of text in a magazine article.

Filing is provided by PaperMaster SE from DocuMagix. This document management program uses a file-cabinet metaphor for its interface. Individual images or collections of images reside in a series

of folders in a drawer. Unfortunately, PaperMaster is limited to black-and-white images with the PageScan.

Black-and-white and 256-level gray-scale images can be scanned at 100 to 400 dots per inch (dpi) in 100-dpi increments. Color

images are limited to 24-bit color and either 100 or 200 dpi, however. This is sufficient for most personal and business uses but falls short of what a graphic artist might need.

The scanner took 43 seconds to scan a 3.5-by-5-inch snapshot in color at 200 dpi, though it took just 13 seconds to scan the same image at 100 dpi. For OCR work, the PageScan took 20 seconds to scan a letter-size page at the default settings, then another 2 minutes 30 seconds to convert the text and load it into Word 6.0 for Windows. These tests were performed with a 486DX2/66 PC running Windows 95.

The quality of the images was generally good, though a few had tiny vertical streaks and some showed minor smearing.

The hand scanner is handy, works well, and means that you don't have to tear pages out of books, magazines, or bound reports in order to scan them. On the other hand, the source document has to be very flat to scan it properly. Of more concern is the fact that the scanner stops about half an inch short of the page's edge.

The Logitech PageScan Color is a compact and convenient device that is more versatile and easier to use than most other color scanners and does more than most monochrome personal scanners for about the same price.

Logitech PageScan Color. Estimated street price: \$399. Requires: 8MB RAM, 12MB hard disk space, parallel port, Microsoft Windows 3.x or Windows 95. Logitech Inc., Fremont, CA; 800-231-7717, 510-795-8500. Circle 425 on reader service card.

variety of column, row, and guidelines arrangements that can subsequently be stored as a series of master pages.

We tested PageMaker 6.0 under Windows 95 to take advantage of faster drawing operations and generally found that most of the functions worked well. Enthusiasm for PageMaker 6.0 should be tempered by a few areas that need improvement. For example, the usually bullet-proof TIFF import filter is suddenly glitchy. PageMaker could not recognize the compression method for—and therefore could not open—a number of .LZW-compressed TIFF files. Though you can import pictures in CIE L*a*b format into PageMaker proper, certain parts of the program (notably the Gallery Effects filters) can't recognize the format.

Despite all the improvements, the program still relies on its antiquated type engine. That means that automatic bullets, numbered lists, and large initial caps (drop caps) are created using kludgy Plug-ins. For example, drop caps are generated using baseline shifts, soft line breaks, and tab spaces.

The CD-ROM that contains the PageMaker 6.0 program files also has a new Table Editor, ATM 3.02, Acrobat Distiller Personal Edition, Acrobat Reader 2.1, PhotoShop LE for Windows, and Type on Call 4.0 (with 220 free unlocked typefaces). When combined with PageMaker's already broad functionality (such as database and spreadsheet import filters and the automatic creation of tables of contents, indexes, and books), the new features and bonus programs make this a complete publishing solution right out of the box.

Adobe PageMaker 6.0 for Windows 95. List price: \$895; upgrade, \$149. Requires: 8MB RAM, 24MB hard disk space, Microsoft Windows 3.1 (with Win 32s extensions), Windows 95, or Windows NT. Adobe Systems Inc., Mountain View, CA; 800-422-3623, 415-961-4400; <http://www.adobe.com>. Circle 435 on reader service card.

WINDOWS 95 UTILITIES

First Aid 95: Strong Preventive Medicine for Windows

By Edward Mendelson

CyberMedia's \$49.95 First Aid 95 combines preventive medicine and emergency care for Windows 3.x and Windows 95 software problems. It won't fix all errors, but you'll probably be impressed by its ability to report on missing files and repair errors in installation and setup.

The program contains two modules, both more useful under Windows 3.x than under Windows 95. One module is a background system monitor that intercepts general protection faults (GPFs), divide-by-zero errors, and invalid operating codes so that you can save your work. The other is a system-repair module that checks for missing application components and Windows drivers, repairs registry entries that point to the wrong directories, and fixes similar setup problems.

The repair module is divided into separate pages for different kinds of testing and repair. All of the pages rely on a database of details about common applications and drivers. The Fix Applications page has data on about 80 common applications—some recent, such as Microsoft Office 95, and some obsolete, such as Visio 1.0. It tests for the presence of files needed for specific features and offers you the option to add them. Many of these features are ones you deliberately chose not to install, and warnings about invalid files in WinCIM 1.4 are merely false alarms.

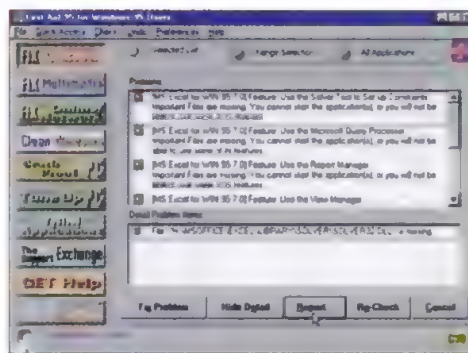
A related page lets you trim applications by removing features and help files that you don't need, and similar pages check multimedia drivers and settings for America Online, CompuServe, and Prodigy. A Tune-Up page tests for optimal settings for Windows performance.

A Clean Windows page works differently under Windows 3.x and Windows 95. The Windows

3.x version cleans up WIN.INI font references and OLE settings, while the Windows 95 version performs a more thorough search in the Desktop and Registry.

Under Windows 95, First Aid reported on one test system that two links from desktop icons to applications were broken—a report that was puzzling at first because there were no such icons on the desktop. But when we let the program fix the problem, it correctly restored two defective OLE associations in the Registry. Although the description was misleading, the fix worked. Similarly incomplete descriptions occur elsewhere in the package, but expert users can drill down to find needed details.

The background monitor



MISSING IN ACTION: First Aid 95 tells you which files are missing from application directories.

doesn't add much to Windows 95, which is robust enough not to need it, but can help in Windows 3.x. On our tests, it even intercepted GPFs produced by First Aid's repair module and let us proceed without losing data. The monitor doesn't get along with Helix Software's indispensable Hurricane, a memory-enhancement program that tries to block it from loading.

First Aid 95, like all medica-

tions, can cause problems in unskilled hands. For example, it warns of problems that don't exist. But it's careful enough not to damage your system when you try to cure them. Updates to the program's database will be available from on-line services and CyberMedia.

If you have Windows problems, First Aid 95 may uncover solutions that you won't find even during an after-hours phone call to technical-support personnel. **First Aid 95.** List price: \$49.95. Requires: 4MB RAM, 8MB hard disk space, Microsoft Windows 3.1 or later. CyberMedia, Century City, CA; 800-721-7824, 310-843-0800; <http://www.internet-is.com/cybermedia>. Circle 408 on reader service card.

ILLUSTRATION SOFTWARE

SmartDraw: Easy Illustrations at an Easy Price

By J.W. Olsen

The newest version of SmartDraw Pro adds many delightful features without sacrificing the easy-to-use interface that distinguished the program's first release (First Looks, July 1995). The \$49 SmartDraw Pro 2.02 offers the same drag-and-drop features of the more expensive packages, such as Visio Corp.'s Visio 4.0 and Micrografx's SnapGraphics 2.0, but makes it easier than ever to create charts and diagrams.

For starters, a new previewer helps you locate the right template for your drawing. SmartDraw 1.x users will be pleased by the addition of more than 1,300 symbols—far more than most draw-

ing packages. SmartDraw has also increased the number of objects (from 180 to 16,000) you can use in a drawing, and they can be grouped together so that a change made to the group affects all of them.

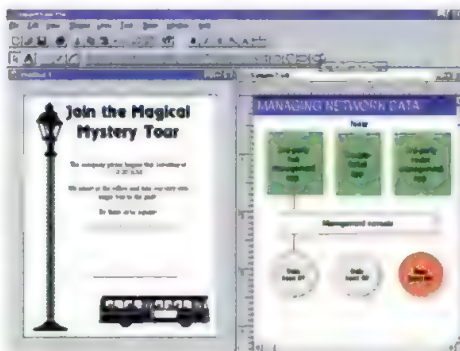
To insert an object in the work-

space, you either drag-and-drop it from the toolbar or click once on the icon and again in the desired workspace location. When you

shift-click on an object, it becomes "sticky," so you can use it repeatedly without returning to the toolbar. Like Visio Corp., SmartDraw Software ships both 16- and 32-bit versions in a single package. The 32-bit version makes good use of Windows 95's features. Handiest of all the additions to SmartDraw are the properties menus that pop up with a right-click, a feature of both the 16- and 32-bit editions.

Ease of use, enhanced features for both Windows 95 and Windows 3.1, and low price make SmartDraw Pro a smart choice for the occasional illustrator.

SmartDraw Pro 2.02. List price: \$49. Requires: 4MB RAM, 10MB hard disk space, Microsoft Windows 95, Windows NT, or Windows 3.1. SmartDraw Software Inc., San Diego, CA; 800-501-0314, 619-549-0314; <http://www.smartdraw.com>. Circle 404 on reader service card.



VERSATILITY: SmartDraw Pro is equally at home creating diagrams, flowcharts, flyers, and more.

space, you either drag-and-drop it from the toolbar or click once on the icon and again in the desired workspace location. When you

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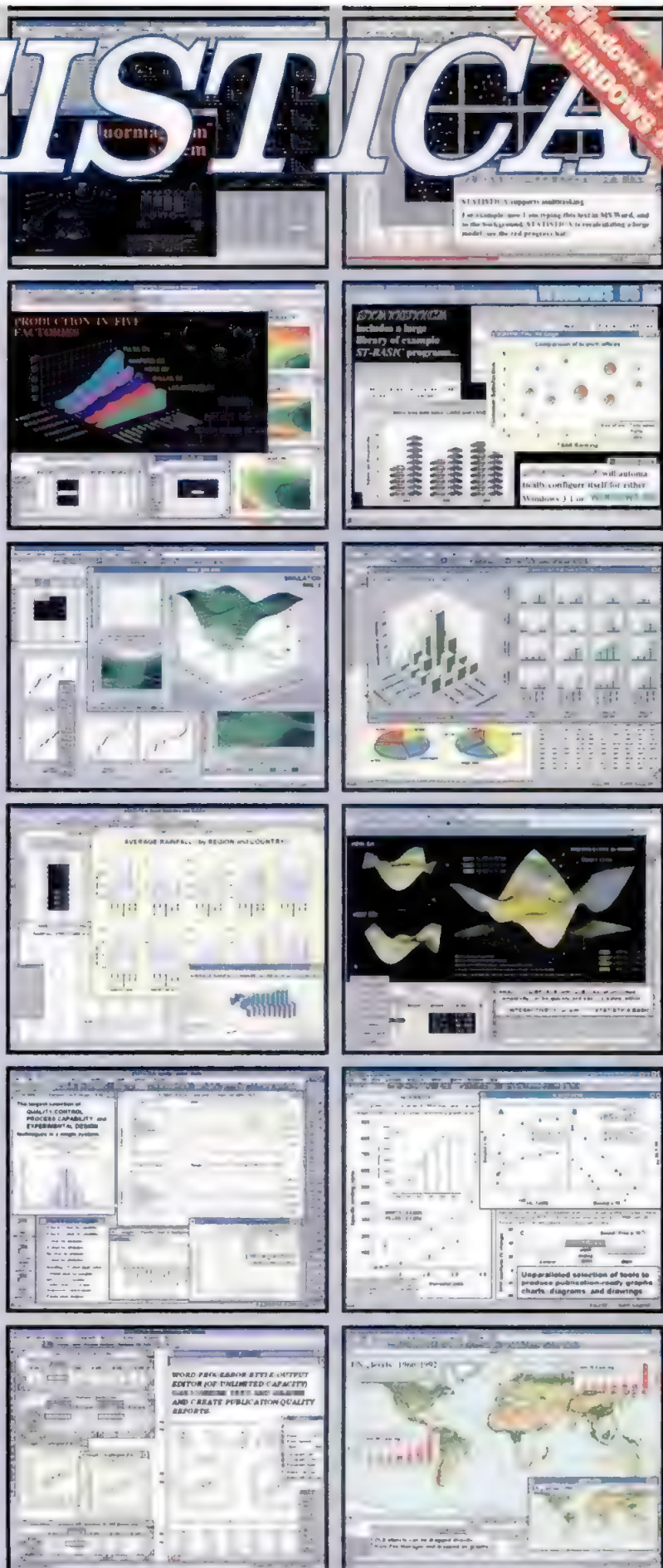
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PROCESS MANAGEMENT

Clear Process: Flowcharts + Analysis = Business Process Reengineering

By Craig Stinson

Flowcharting programs abound, but thus far only a few include tools that let you analyze the efficiency of the processes your flowcharts depict. Into this sparsely populated "process management" field steps Clear Software's \$495 Clear Process 1.0.

Built on the Win16 platform, Clear Process is a superset of allClear 3.5. A loader module lets you enter names, descriptions, owners, and status categories for any process you want to diagram or analyze. From there, a mouse-click takes you either to allClear, where you can create or edit your flowchart, or to the new analytic module.

In the analytic module, your flowchart appears in a tiled pane alongside a four-page spreadsheet that partially emulates Microsoft Excel. On one page of the spreadsheet, you record pertinent information (for example, time and cost) associated with each step of the flowchart.

As you analyze your process, the program records calculated values on two other spreadsheet pages. An additional scratch page lets you enter annotations, save items of interest from earlier analyses, and so on. Data may be imported to the spreadsheet from Excel or Lotus 1-2-3, but the program does not support dynamic links to external data repositories.

Clear Process offers three kinds of analysis: a walk through any selected process path, an automatic analysis of all possible paths, and a Monte Carlo-style simulation that takes into account probabilities that you assign to branch points. In walk-through mode, you establish a path by clicking flowchart boxes. As you do, Clear Process displays a running total of your costs and other variables.

In automatic mode, the pro-

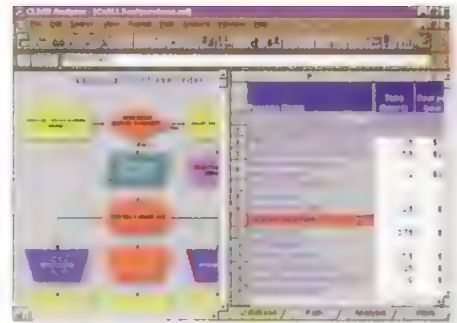
gram compares all possible paths, allowing easy identification of those paths that minimize resource usage or maximize returns. Planners involved in business process reengineering can use this information to optimize operations.

In simulation, the program can show the most probable path, as well as the resources likely to be needed for the attainment of particular goals. The simulation mode also lets you model—in a somewhat rudimentary fashion—the concurrent events that typify real-world processes.

Clear Process's flowcharting component is exceptionally strong, if idiosyncratic. Its charts are specified via text outlines rather than drawing tools. The spreadsheet orientation of the program's ana-

lytic component provides easy "what if" capability and will make most analysts feel at home. The separation of charts and data that results from the program's component architecture admirably serves users' security requirements.

Certain aspects of the program's user interface will frustrate some users, however. For example, the program's employment of panes instead of the Windows multiple-document interface means that graphs cannot be printed separately from worksheet data. The worksheet itself violates some established conventions and lacks an easy way to



ANALYZE IT: Clear Process displays a spreadsheet alongside flowcharts, animating the chart while you simulate your process.

make cell references absolute. Moreover, users who would like to model complex forms of concurrency may find the queue options in Scitor's Process Charter better suited to their needs.

Clear Process 1.0. List price: \$495. Requires: 8MB RAM, 4MB hard disk space, Microsoft Windows 95 or Windows 3.1. Clear Software Inc., Newton, MA; 800-338-1759, 617-965-6755. Circle 428 on reader service card.

UTILITIES

MacOpener Moves Mac Files to Your PC

By J.W. Olsen

If you've ever transferred Mac files to Windows 95 or Windows NT, you've probably used a Windows 3.1 utility. And if that tool was Software Architects' Here & Now, it didn't fare well in 32-bit territory. DataViz, developer of Conversions Plus (First Looks, September 26, 1995), has

eased the transition with its \$49 MacOpener, Version 1.0.

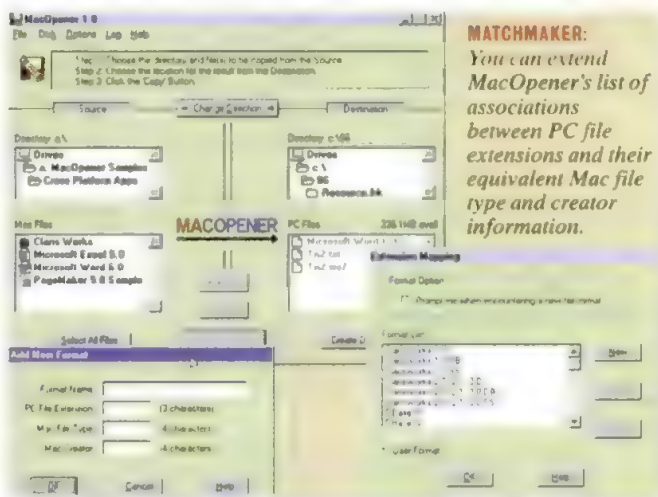
MacOpener ships with two versions. A 16-bit Windows 3.x version compares favorably with Here & Now, Hypro Technologies' MacAccess, and Insignia Solutions' MacDisk. The 32-bit version installs whether you're running Windows 95, Windows

NT, or Windows 3.x with Win32s extensions.

We tested MacOpener on a Windows 95 system using the program's own interface. On Windows 3.x systems, DOS and Windows apps recognize high-density Mac disks as if they were PC disks through an optional device driver. But on Windows 95 systems, MacOpener understands long filenames—a delight when working with Macintosh documents.

MacOpener lacks the file-format conversion routines of Conversions Plus. But until a Windows 95-compliant Conversions Plus is released later this year, MacOpener leads the race between the Mac and Windows 95.

MacOpener, Version 1.0. List price: \$49. Requires: 4MB RAM, 1MB hard disk space, Microsoft Windows 95, Windows NT, or Windows 3.x. DataViz Inc., Trumbull, CT; 800-733-0030, 203-268-0030; fax, 203-268-4345. Circle 405 on reader service card.



MATCHMAKER: You can extend MacOpener's list of associations between PC file extensions and their equivalent Mac file type and creator information.

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 **GATEWAY2000**

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By Edward Mendelson

In this miniroundup of the 15 newest and most interesting Windows 95 utilities, we paid particular attention to which utilities required space in the taskbar tray. With so many innovative and helpful programs to choose from, it appears that the death of the

Sorting Out Windows 95 Directories:

The Directory Sort program from pre-Windows 95 versions of

Windows 95 Meets Windows NT: ChaoSoft's splendid \$29.95 Step-Up utility for the Windows NT file manager brings the best features of the Windows 95 Explorer to Windows NT. Pop-up menus bring fast access to file viewing and management. This indispensable utility works with the beta version of the new Windows NT shell (which

Quick-Change Artist: Part of the free PowerToys package available

RTVReco: You can automate just about any Windows 95 function with RTVReco.

First Looks

from Microsoft's Web site and elsewhere, this tiny program lets you switch instantly among 256-color, high-color, and true-color display modes, and among 640-by-480, 800-by-600, and 1,024-by-728 resolutions without restarting Windows 95. It will be built into the next version of Windows, but for now, it is the final word for quick-change artists. Internet: <http://198.105.232.6/windows/software/power/toy.htm>.

Automation Windows 95: RTVReco is a utility that is sort of like having an octopus to assist you at the keyboard. RTVReco automatically pushes buttons, runs batch files, or performs other actions when specified dialog boxes appear on-screen. RTV Software's freeware program comes configured to push the Reconnect button when Windows 95 tells you that you've lost a dial-in connection. RTVReco installs in the taskbar tray, but once there can make itself invisible. Internet:



From January 15 to 19, you can go on-line to discuss Windows 95 utilities with the software authors and with PC Magazine reviewer Edward Mendelson. Type GO EXECONLINE at any CompuServe! prompt to join in.

<http://www.demon.co.uk/rvsoft>.

Filling the Taskbar Tray: TrayIcon puts an icon for any application or file in the taskbar tray. Brian McCarty's \$5 shareware program installs one or more applications on the tray for one-click access. Some of the program's options let you run the application maximized or minimized or prompt for input. CompuServe: 75121.2130.

Design Your Own Interface: The most powerful of Microsoft's free set of PowerToys, this Control

Panel applet gives you more control over Windows 95's look and feel than any other program around. It replaces the standard shortcut arrow with a less obtrusive version, and lets you put the Control Panel and other folders on the desktop. You can also set boot options and create file templates for the New menu. Internet: <http://198.105.232.6/windows/software/power/toy.htm>.

Easy-Access Directory: One click

on WinGO's road-sign icon on the taskbar tray makes a menu pop up with a list of descriptive names of the directories you most often use. Click on one of the names and an Explorer window displays the directory's contents. At \$20, this shareware program from Steve Saxon is a steal. CompuServe: 100321.2355.

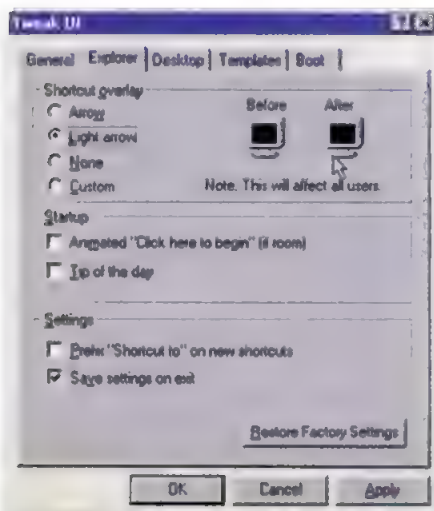
Giving Win 3.1 a Helping Hand: WinHacker 95, a \$10 shareware program from Wedge Software, controls a miscellaneous set of registry settings, including icon title word-wrap, menu-animation, and start-up options. Though not as wide-ranging as Tweak UI, WinHacker can make user-specified Windows 3.x applications run more reliably under Windows 95 by lying to the program about the Windows version number, or by increasing the program's allotted stack space. CompuServe: 72633.231.

Opening the Windows 95 Shade: WinShade makes the active window roll up like a window shade when you click on the title bar, and roll down when you click again. This cute \$5 shareware utility by Sapphire can save desk-

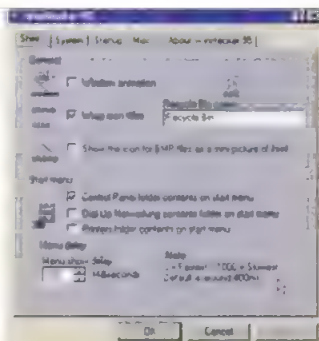
top space when you need it. The program also works with windows that you can't minimize, such as your word processor's Find dialog box. The program installs on the taskbar tray. Internet: lemmings@mit.edu.

Text or Hex—Your Choice: There's still no Windows 95 equivalent of Vern Bueg's famous List file-viewer utility, but WnBrowse, Nigel G. Thomas's \$15 program, comes close. It installs on the right-click menu and views any file in text or hexadecimal format. There's also an extensive set of search options. Unlike Windows 95's QuickView file-viewing utility, WnBrowse works even if the extension isn't registered. CompuServe: 100117.1542.

The Easy Way to Unzip Files: Silicon Prairie Software's \$29.95 shareware Zip Explorer manages ZIP files from the Windows Explorer interface. Unlike Nico Mak's WinZip95, Zip Explorer isn't a separate executable program but a powerful .DLL that attaches to Explorer itself, and creates new ZIP files with the same ease that it opens existing ones. Internet: plummer@iceonline.com.

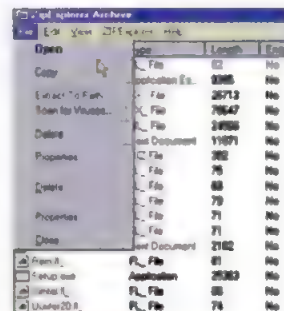


TWEAK UI: Tired of the standard-issue Windows 95 interface? Go ahead, design your own with Tweak UI.

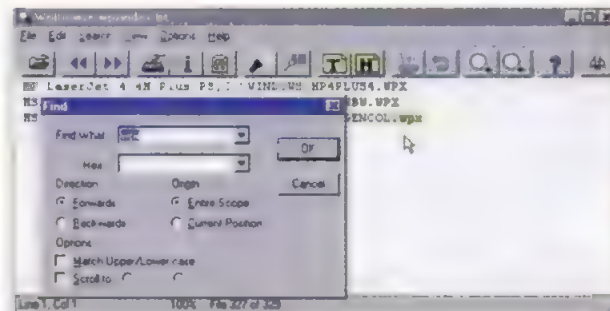


WINHACKER 95:

This program acts much like a helping hand when it's time to tweak your Registry settings and other system files.



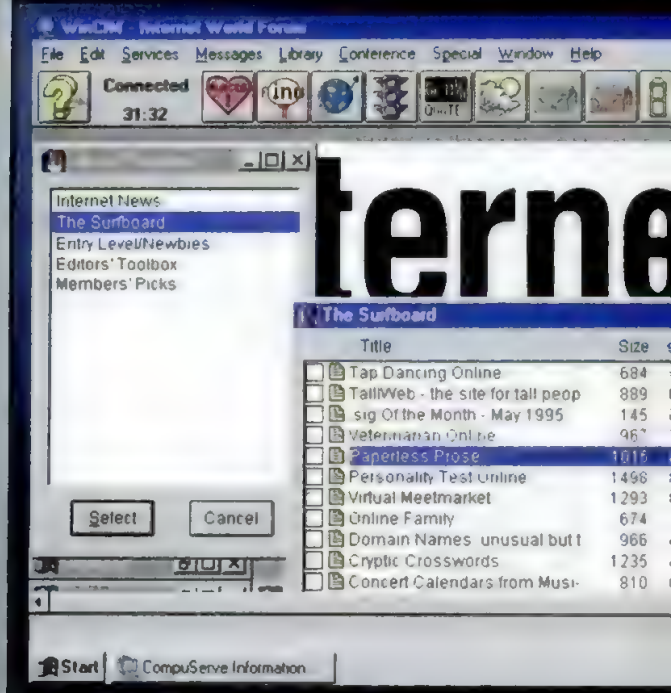
ZIP EXPLORER: Zip to your heart's content with this utility.



WNBROWSE: View any file in either text or hexadecimal code with this useful program.

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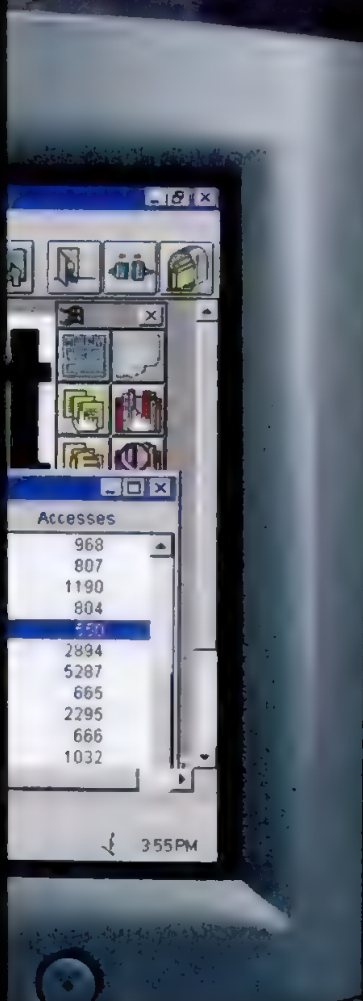
Keep my independence.

Windows® 95, an Intel® Pentium® processor*, and 16MB of

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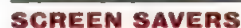
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By Sebastian Rupley

The system's 10.4-inch active-matrix color display produced crisp and rich colors, and was a pleasure to work with. An integrated Apple trackpad comes flanked by PowerBook-standard large-size palm rests. There are two Type II PC Card slots, each



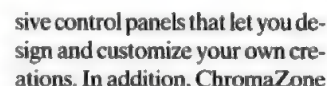
100, and compared the results with those of an Apple Quadra 630 with a 33-MHz 68040 CPU and 8MB of RAM. The Quadra 630 scored a 10.0 on the Processor, Floating Point, Disk, and Video tests. The 5300c/100 posted a respectable 30.0 on the Processor test, and posted several other impressive scores. The biggest performance gain was in the area of floating-point operation in which the 5300c/100

By Mary Paulson

ChromaZone is different, because you control every color, surface, pattern, or object. You can even specify how many galaxies you want in your sky composition or the depth of your back-

ground perspective.

Scroll through the 100 ready-made screen savers or open the sliding door to reveal the exten-



A bright spot on that front, however, is the new version of *Continues on page 56*

ChromaZone is a fun and inexpensive program that can bring out the 3-D artist in each of us. **ChromaZone.** List price: \$24.95. Requires: Microsoft Windows 3.1 or Windows 95. Gibson Research Corp., Laguna Hills, CA; 714-438-7100; fax, 714-348-7110. *Circle 407 on reader service card.*



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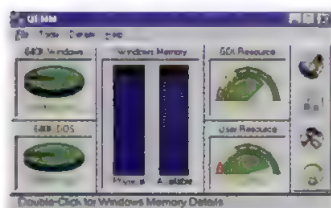
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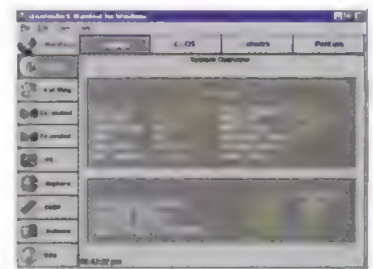


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PowerBook

Continued from page 54

Insignia's SoftWindows emulation software, which will allow the 5300c/100 to run any Windows 3.x application. But our recent testing of SoftWindows 2.0 (see First Looks, November 21, 1995) showed it to be only about as fast as a 486DX/25 PC at running Windows software.

The software compatibility compromise that is inherent with the PowerPC platform means that PowerPC-based PowerBooks are best for those who tend to work in just a few primary applications—such as Photoshop and Quark XPress—noted for their speed and efficiency on the Macintosh platform.

STRIPPED OR LOADED

While a stripped-down 5300c/100 with 8MB of RAM and a 500MB hard disk can be purchased for as little as \$3,699, we recommend adding extra memory and disk space. Still, the \$4,499 version, with 16MB of RAM and a 750MB hard disk, is worth the extra money for those running any type of graphical application.

For those who intend to run Windows applications under Insignia's SoftWindows 2.0 emulation software, the 8MB of extra RAM is an absolute must, and we recommend another 8MB of memory (for a total of 24MB of RAM).

If you're parked in front of Photoshop all day, the 5300c/100 is a nice extension of the PowerPC platform in a notebook. But if your goal is to mix and match the maximum number of software applications, PC notebooks, such as the winners in our roundup last summer (see "Your Portable Persona," August 1995), may make more sense.

Apple PowerBook 5300c/100. List price: With 16MB RAM, 750MB hard disk, 10.4-inch active-matrix color display, \$4,499. Apple Computer Inc., Cupertino, CA; 800-538-9696, 408-996-1010; fax, 408-974-9974; <http://www.apple.com>. Circle 403 on reader service card.

NOTEBOOKS

Multibook C300: On-the-Fly Power Presentations in a Notebook Computer

By John Morris

The main selling point of Boxlight Corp.'s Multibook C300 is a detachable LCD screen that works with an overhead projector for making colorful presentations on the fly. Though the \$5,999 Multibook can't compete with the current crop of Pentium-based portables in terms of price and performance, its innovative presentation features challenge other overhead-ready designs like the IBM ThinkPad 755 CV (First Looks, July 1995).

At first glance, the Multibook looks much like any other notebook computer, although with a travel weight of 8.4 pounds including the AC adapter, it is a bit heavier than some of the latest designs. The 2.5- by 11.5- by 9-inch unit includes a comfortable, 84-key keyboard and integrated trackball.

The Multibook's 10.4-inch active-matrix color display can be detached quickly, and a 5-foot cable connects the notebook to the screen. With its two small legs extended, the screen rests securely on any standard-size overhead projector. The entire process took less than 2 minutes, and was significantly easier than it was for the IBM ThinkPad 755 CV. Unlike the ThinkPad, which can be difficult to position on the projector so that the entire screen is in focus, the Multibook managed an image that was reasonably clear and bright when projected onto a screen. The



SPLIT PERSONALITY: The Multibook C300 is both a capable notebook computer and a powerful presentation tool.

LCD panel displays up to 64,000 colors at 640-by-480 resolution, which was good for a readable projected image of approximately 11-feet, measured diagonally.

A lightweight fan snaps onto the edge of the Multibook's screen to dissipate heat from the overhead projector and prevent damage to the screen. In contrast, the ThinkPad's screen can overheat and turn brown with projectors that generate more than 6,000 lumens.

When attached to the notebook, the Multibook's screen is crisp and bright. Slide controls above the keyboard allow you to adjust contrast and brightness. For multimedia presentations, there are built-in stereo speakers above the screen's hinges and a 16-bit, Sound Blaster-compatible

card on board.

The Multibook comes with 16MB of RAM, upgradable to 48MB, and a 510MB removable hard disk. Powered by a DX4/100 processor, the notebook posted respectable though not outstanding scores on our tests. The Multibook we tested had a Winstone 96 score of 10.3, and processor scores of 57.3 and 50.7 on the CPUmark₁₆ and CPUmark₃₂ benchmark tests, respectively. The unit's nickel-hydrate battery lasted 2 hours 31 minutes on our WinDrain test.

Boxlight Corp. offers an optional hand-held remote control, which functions like a cordless mouse, for \$159. Other options include an expansion port on the back panel that can be used to attach a docking station, with slots for two 16-bit ISA cards, and a multimedia adapter that allows you to connect the Multibook to a TV, VCR, or camcorder.

The Multibook won't win any awards for its performance, but it has enough muscle to handle typical business and presentation chores, making it a good travel companion for sales and training executives.

Multibook C300. List price: With DX4/100 CPU, 16MB RAM, 543MB hard disk 10.4-inch active-matrix display, \$5,999. Boxlight Corp., Poulsbo, WA; 800-779-7901, 360-779-7901; fax, 360-779-3299. Circle 406 on reader service card.

BENCHMARK TESTS



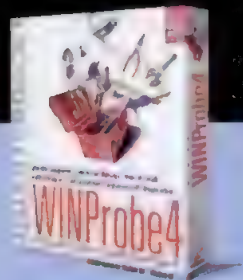
Boxlight Multibook C300

Powered by a DX4/100 CPU, the Boxlight Multibook C300 produced respectable scores across the board. Its 2-hour-31-minute battery time was its standout score.

We used Winstone 96, Version 1.0, to measure the performance of the Multibook C300, and WinDrain to gauge its battery life. The notebook had 16MB of RAM.

Higher scores represent better performance.

	Winstone 96	Graphics WinMark 96 (Mpixels/sec)	Disk WinMark 96	CPUmark ₁₆	CPUmark ₃₂	WinDrain (hours: minutes)
Boxlight Multibook C300 (DX4/100)	10.3	3.2	376	57	51	2:31
Average Pentium/120 notebook (First Looks, December 19, 1995)	44.3	10.6	646	198	186	2:07



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3-D ILLUSTRATION

Visual Reality and TriSpectives: Two Radically Different Approaches to 3-D Design

By Daniel Grotta and Sally Wiener Grotta

The challenge for any 3-D modeling and animation software is making a 3-D world on the flat surface of a computer screen. Two powerful programs—Visual Software's \$259 Visual Reality 2.0 and 3-D/EYE's \$299.95 3-D/EYE TriSpectives 1.0—approach this problem in very different ways. Both produce professional-quality photorealistic 3-D models and animations, but Visual Reality uses the traditional wireframe model and final rendering approach, while TriSpectives sports a novel WYSIWYG interface with real-time, on-the-fly polygonal modeling.

Visual Reality is a versatile, powerful, and relatively easy-to-use suite of 3-D programs. It has a library of literally thousands of 3-D shapes, textures, and animations (over 2GB on seven CD-ROMs). Among these are fully animated fantasy worlds such as Jurassic Park and Orbit City.

The main component for creating and animating 3-D models, called Renderize Live, has an icon-based interface that can be tough to grasp at first. Visual Reality reduces complex procedures to smaller, more manageable steps. In Renderize Live, you choose among Resource Buttons (View, Object, Material, Lights, and Images) to determine which Resources can be edited, animated, and viewed. Toolbars (Render, Color, Normal, Move, and Select) are also selected with icons. The fine details of design (reflection, color, texture, etc.) for all the Resources are nested in various Designer dialog boxes.

Creating animation first involves defining different camera views, which become keyframes in the Animation Designer dialog box. The camera's path is then viewable and editable. Similarly,

the creation of animations for lights, objects, materials, and images is broken down into customizable steps. Renderize Live does not have an Undo option in the main window, though single levels of Undo are available in the Resource Designer dialog boxes.

While working in Renderize Live, you will need to slip in and out of the other programs in the suite. Especially useful is the Visual Catalog, a database of all projects that allows previously created objects, materials, views, and images to be dragged-and-dropped into new 3-D projects. Need the color and texture of an apple? Pluck the apple object from the fruit bowl in the Visual Catalog.

By using the CD-ROM libraries with the Visual Catalog, you may never have to define new textures or shapes from scratch. That's good, because creating original 3-D shapes is complicated and cumbersome.

3-D/EYE TriSpectives 1.0 is an intuitive and fun-to-use program based on the realistic representations of shapes rather than wire-

shapes that take the guesswork out of defining spatial relationships between objects. If you want to put a vase on a tabletop,



QUICK ON THE DRAW: Visual Reality's Renderize Live feature quickly transforms wireframes into realistic-looking 3-D designs.

the IntelliShapes know where the tabletop should meet the vase's bottom. You can make objects slide across or intersect each other's surfaces or even fall through each other.

IntelliShapes, colors, textures, backgrounds, and other attributes are organized into catalogs that, when open, form a tabbed notebook to the right of the screen. Even specific animation effects—

such as Bounce In Place, Corkscrew, and Fly In—are included. Though this feature makes TriSpectives' animation the easiest to use of any 3-D program, it lacks Visual Reality's sophistication and control.

The approximately 1,000 IntelliShapes range from abstract shapes and holes to plumbing and building supplies. TriSpectives'

open architecture will likely lend itself to plug-in catalogs from manufacturers of parts and supplies.

TriSpectives' simple interface masks some powerful features. For example, a right-click brings up extensive options, including

precision to 16 decimal places. In addition, it's OLE 2.0-compliant, allowing, for instance, a 3-D model embedded in a spreadsheet to remain fully editable. Visual Reality is not OLE 2.0-compliant but does support drag-and-drop.

TriSpectives saves projects in a Workbook, in which individual Scenes and Pages are tabbed documents. Scenes contain models

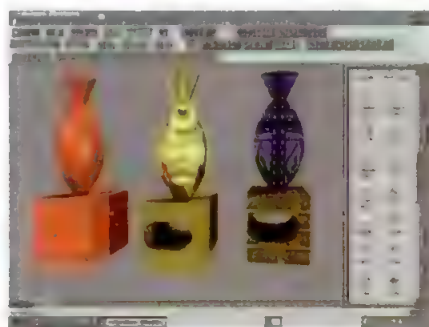
that exist fully in 3-D space and Pages are collages that are printable. This emphasis on print underscores one of the program's design philosophies: 3-D models are meant to be shared. This is even more evident in TriSpectives Professional (\$499.95), which supports Advanced CAD format filters (IGES, STEP, STL), technical-illustration capabilities,

and accurate positioning, making it suitable for computer-assisted manufacturing (CAM).

Both programs are 32-bit Windows 95 Plug and Play applications, and both install from CD-ROMs. For those who are unfamiliar with 3-D modeling software, wireframes can be intimidating. But others prefer direct hands-on mathematical feedback and animation control. And Visual Reality's highly imaginative fantasy worlds of clip art are exciting and fun to use. Still, TriSpectives' ease of use, combined with its underlying power, does look like the shape of the 3-D future.

Visual Reality 2.0. List price: \$259. Requires: 12MB RAM, 40MB hard disk space, Microsoft Windows 95 or Windows 3.1, DOS 5.0 or later. Visual Software Inc., Woodland Hills, CA; 818-883-7900. Circle 426 on reader service card.

3-D/EYE TriSpectives 1.0. List price: \$299.95. Requires: 8MB RAM, 15MB hard disk space, Microsoft Windows 95, Windows NT, or Windows 3.1. 3-D/EYE Inc., Ithaca, NY; 800-946-9533, 607-257-1381. Circle 427 on reader service card.



DRAG-AND-DROP DESIGN: With TriSpectives' IntelliShapes, you can design sophisticated 3-D objects in minutes.

frames. For instance, a banana looks like a piece of yellow fruit instead of an abstract sketch of lines and interstices.

TriSpectives' fundamental building blocks are the program's IntelliShapes—3-D geometric

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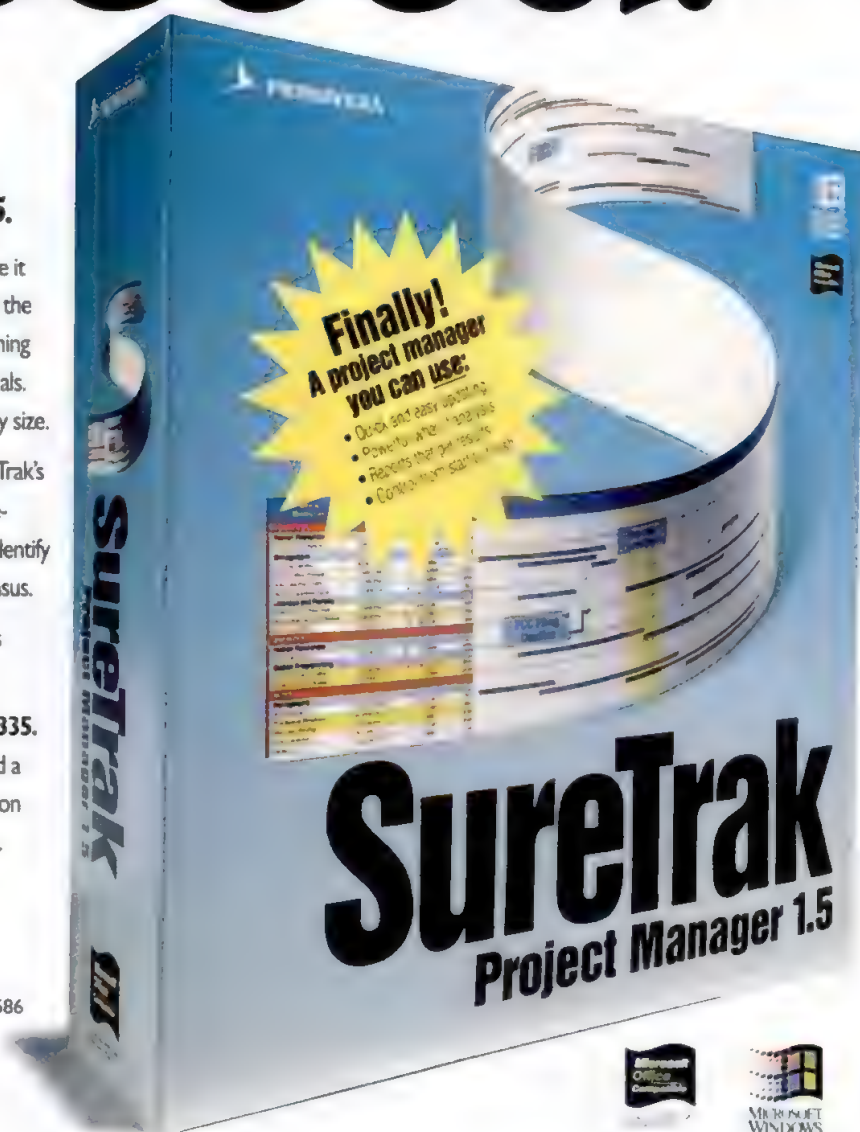
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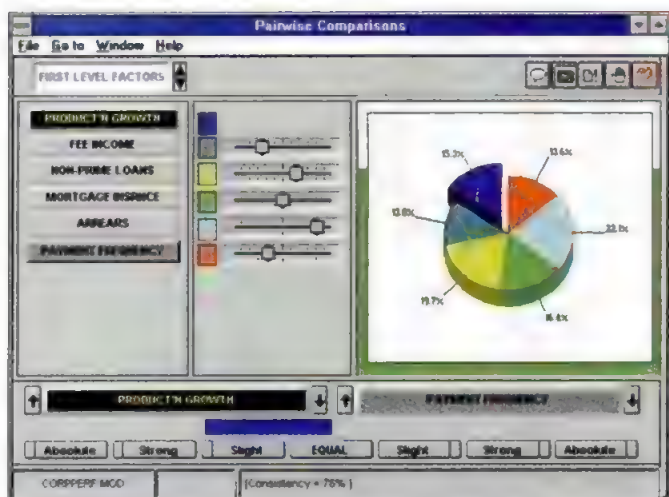
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BUSINESS FORECASTING

To Do or Not to Do: Two Business-Oriented Decision Makers

By Kathy Yakal

Making big business decisions requires more than scribbling down the pros and cons of each situation and weighing the possible outcomes. Two companies have devised innovative PC-based tools to help you zero in on the factors involved in a decision, prioritize and weigh their importance, and arrive at a conclusion based on a carefully balanced rationale.

Avantos's \$149 DecideRight 1.0 is brand-new, and its interface is about as visually intuitive as software gets these days. You enter your factors and prioritize them, and a quick report defines your best choice and explains why. Arlington Software's \$179 Which & Why 3.11 is not nearly as intuitive, but it may be a better choice for complicated decision trees with dependencies that have thousands of possible outcomes.

DecideRight's simplicity is augmented by

its optional QuickBuild tool, an interface navigator that asks you questions about the project and enters your responses in the correct places. Once you've defined your options (such as the types of network you might purchase) and the criteria (purchase price, maintenance plans, or vendor reputation), you rank each option in terms of importance and rate each criterion in relation to the others.

Once your ratings look good, you can generate a report in several formats, ranging from a summary to a full report to a full-blown presentation. If you prefer, you can bypass QuickBuild and work directly with the tables.

If the calculated decision doesn't look right, or if you want to consider some alternative scenarios, you can use the original table as a template, dragging-and-dropping criteria weights and options ratings. DecideRight's Sensitivity Indicators are helpful in making group decisions. They illustrate visually how much

an option's rating will affect the outcome.

DecideRight comes with 16 sample decisions. You can also use DecideRight's on-line Advisor to get guidance on decision-making principles and how they're implemented in the program. Table images can be exported directly as .WMF files or through the Clipboard to your word processor or graphics editor.

Which & Why launches your decision-making process much like DecideRight does. You build a model based on up to 10,000 factors, which you can rank and prioritize to arrive at a weighted average for up to 32,000 potential outcomes. You can either assign weights manually or use the program's Pairwise Comparisons to assign weights based on relative ratings of the factors.

Using a matching index, Which & Why then evaluates how closely each potential choice compares with an ideal. This way, even if two options come up with similar weighted averages, you'll know which most closely matches the desired scores for every criterion.



STEP-BY-STEP: DecideRight's QuickBuild navigator walks you through the major steps of decision-making.

You have a choice of how to look at the resulting data. A comparison can be viewed as either a numerical report or a graph that illustrates the program's recommendations quite clearly.

Like DecideRight, Which & Why lets you tweak your database before making a final decision. You can, for example, edit factors and pull out a subset of "must-haves" to scrutinize more carefully the most critical factors in your decision. The program's

groupware capabilities make it possible to break down a major decision among several independent contributors. You can export option lists, models, factor and must-have scores, and recommendation data to any of several applications using the program's ODBC drivers. Data can also be imported.

Though it requires more up-front time than DecideRight, Which & Why offers more helpful examples. There are almost 100 templates illustrating decisions ranging from buying a new TV to making a business international. Which & Why uses conventions like sliding bars and outline trees for fine-tuning your rankings, and 3-D charts and graphs for illustrating results.

Both of these programs take similar paths to arrive at decisions, though complexity and usability differ. Which & Why's steeper learning curve makes it unsuitable for those looking for occasional help with simple decisions, but its weighted analyses and groupware capabilities make it an effective enterprise tool. DecideRight's simplicity makes it appropriate for a larger audience.

The choice between Which & Why should be based on whether you want simplicity or the thoroughness of a program that can examine complicated decisions.

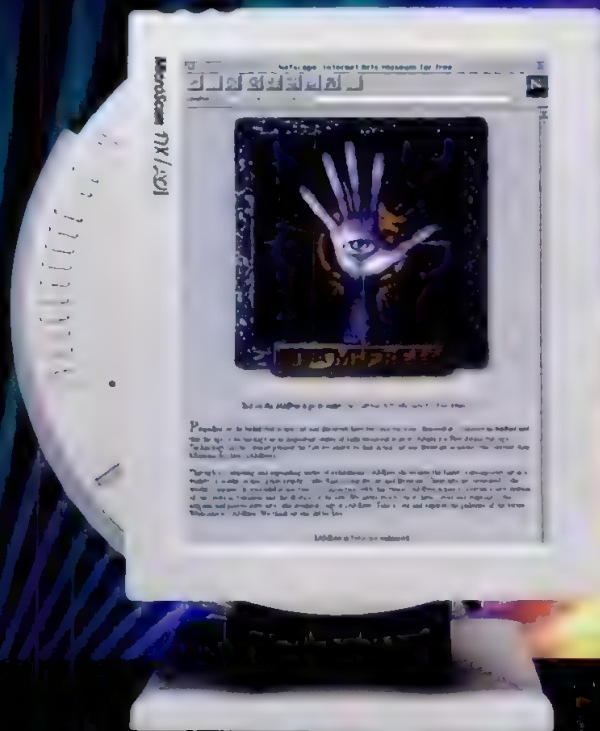
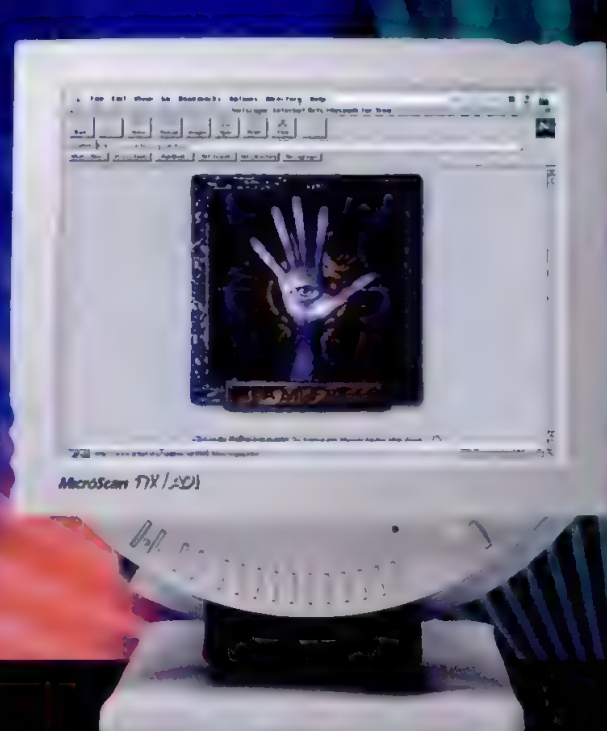
DecideRight 1.0. List price: \$149. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1

or later. Avantis Performance Systems Inc., Emeryville, CA; 800-282-6867, 510-654-4600; fax, 510-654-1725. **Circle 401 on reader service card.**

Which & Why 3.11. Estimated street price: \$179. Requires: 4MB RAM, 13MB hard disk space, Microsoft Windows 3.1 or later. Arlington Software, Montreal, Quebec, Canada; 800-496-1303, 514-954-3665; <http://www.arlingsoft.com/ww/>. **Circle 402 on reader service card.**



From January 8 to 12, you can go online to discuss these two programs with Avantis's James Aguilar, Arlington Software's Don Lobley, and reviewer Kathy Yakal. Type GO EXEC at any CompuServe! prompt.



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The ADI MicroScan™ 17X monitor puts a whole new spin on the way you work. In seconds, it can switch from landscape to portrait without closing any running applications.

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The MicroScan 17X is like getting a 21" display for the price of a 17" monitor. Its vertical viewing area in portrait mode is larger than any 17" or even 21" monitor on the market, and easily accommodates an entire 8.5" x 11", legal or A4 page in portrait view. No need to scroll or print to see the whole page. This means you'll be able to do twice as much in half the time.

High-Quality Feature Set

The MicroScan 17X also has many other things to flip over. Like a 17" CRT display with a 16" diagonal viewing area, 1024 x 768 resolution, flicker-free 76Hz performance, .28mm dot pitch, microprocessor digital controls, even Plug-n-Play compatibility. It's a feature set you won't find in competitively priced monitors. And since ADI builds monitors for leading PC companies worldwide, you know you're making a quality investment for the long haul. The MicroScan 17X is also backed by a three-year warranty. Best of all, you don't have to be a Web Master to get one. Just call 1-800-228-0530 for your nearest dealer.

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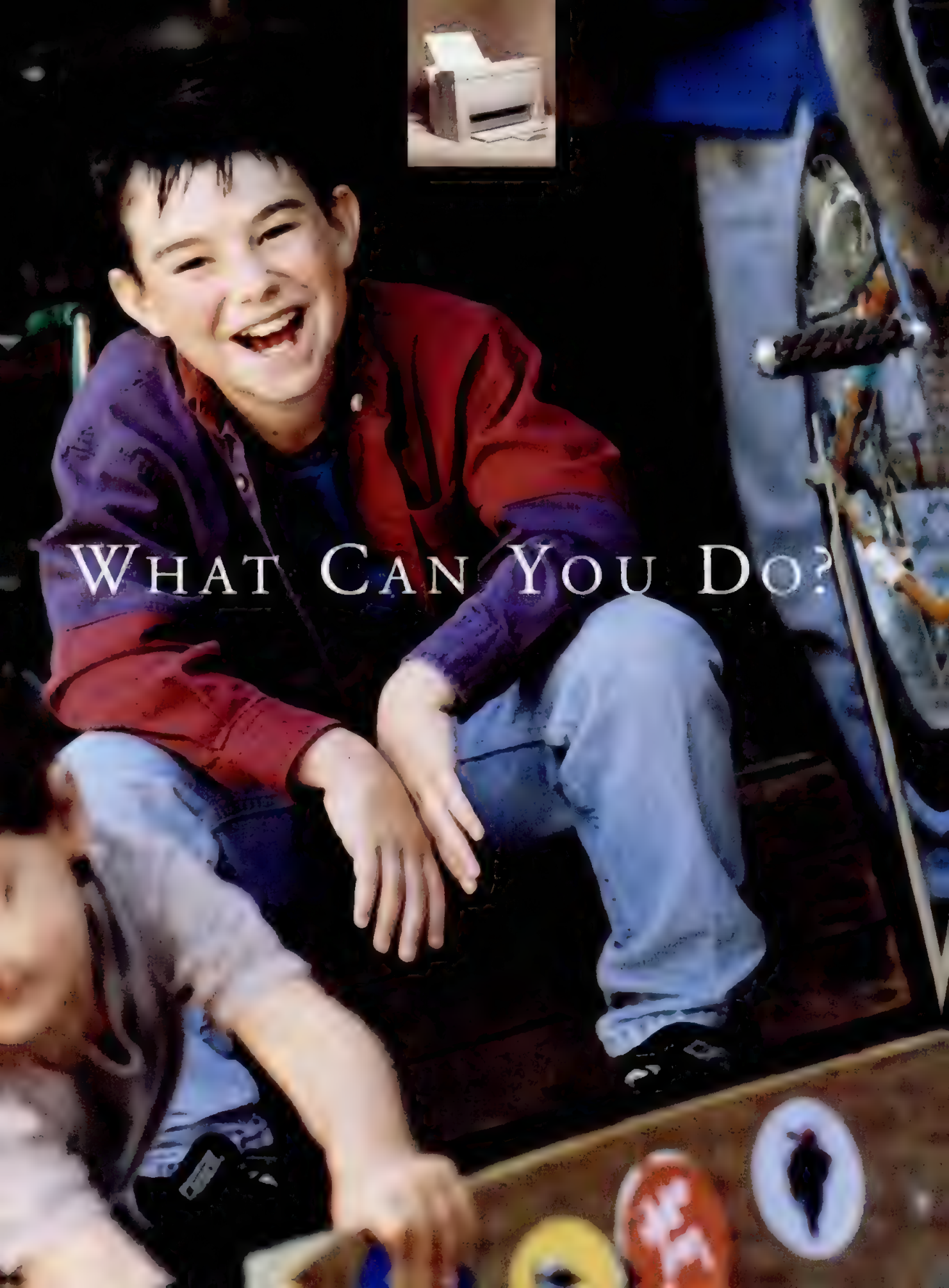
ADI Systems, Inc., 2115 Ringwood Avenue, San Jose, CA 95131

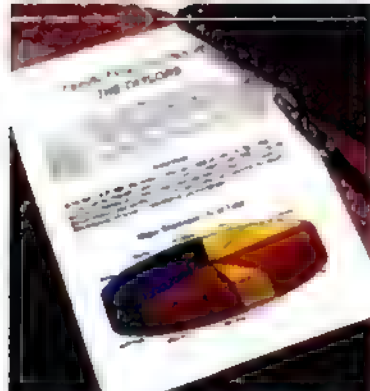
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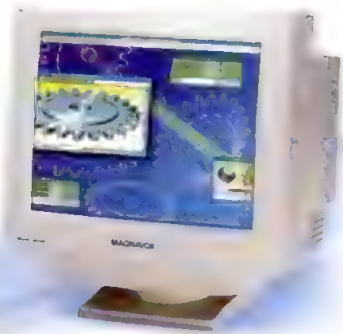
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Canon

COOL STICKERS

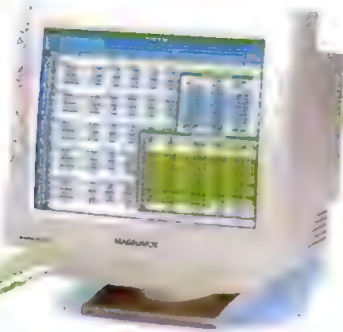


The Techies Want Performance.



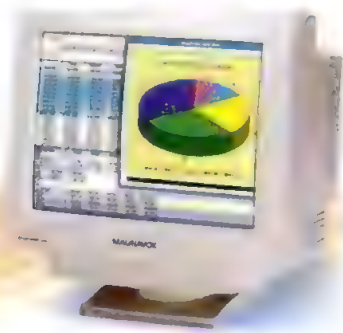
Multi-talented. A brilliant addition. Magnavox monitors offer resolutions up to 1600 X 1280, refresh rates over 100Hz and a 0.28mm dot pitch for sharp, vibrant color and flicker-free images.

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Terrific value. A real deal. With autoscans capability, precise on-screen display and energy-saving, built-in power management, Magnavox monitors give you more for your money.

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CIRCLE 015 ON READER SERVICE CARD

Second Looks

LIVING WITH THE PRODUCTS WE REVIEW

By Brian Nadel

PIMs

GoldMine's Hang-Ups

IN OUR AUGUST 1995 ROUND-up of personal information managers ("Share the Wealth"), we were so impressed with the range of features in GoldMine for Windows 2.5a—including its autodialer—that we gave this workgroup PIM our Editors' Choice.

NOTEBOOKS

Dell Latitude's Communications Breakdown

OVER A VARIETY OF CPUS AND CONFIGURATIONS, THE Dell Latitude XPi family of notebooks has consistently delivered high marks for both performance and value (see "Your Portable Persona," *PC Magazine*, August 1995). Add in the optional Megahertz X-Jack PC Card modem and you have a powerful communications center that fits in a briefcase.

That is, unless you have one of the 90-MHz Latitude XPi notebooks that keep the X-Jack modem from making a connection. According to Dell, this glitch is based on an incompatibility between the Latitude's BIOS and its Vadem PCMCIA controller chip.

Dell technical service offers two fixes: one that involves swapping the system's BIOS and another that doesn't. For those who are willing to update the system's flash BIOS, a new X-Jack-friendly version is available from the company's bulletin board (512-728-8528). Of course, if you

can't get the modem to work, you certainly can't download the file that's needed to get the modem to work. Fortunately, Dell also makes the new BIOS available on disk by mail. To order, call 800-624-9896.

For those who don't want to change the system's BIOS—or for corporate users unable to do so without incurring the wrath of an insensitive administrator—a new version of the Vadem chip's control file is available from the same sources.

As it turns out, for systems that have old communications drivers loaded, the program's autodialer sometimes works only on the first try. On subsequent attempts the system gets a dial tone and hangs up before the connection is made.

Elan Software has fixed this problem with an updated .DLL file. The patch, which lets you use the autodialer on all calls, is available for downloading from library 2 of CompuServe's GoldMine forum. It's called SYNC DLLS.ZIP.

MEMORY MANAGERS

Still Waiting For Windows 95?

ALTHOUGH MOST INTREPID Windows 95 upgraders have chosen to use the CD-ROM version of the operating system to save time on installation, those with notebooks and older PCs without CD-ROM drives have been stuck working through a Leaning Tower of Pisa—like a stack of floppy disks. It now turns out that if your PC is using Version 3.02 or higher of Helix Software's NetRoom, you won't be able to upgrade to Windows 95 from floppy disks—period.

According to Helix, the easiest fix is to uninstall NetRoom prior to loading Windows 95, and then re-



install it after Windows 95 is in place. If you want to keep NetRoom on your PC, you'll need to disable the program's cloaked disk cache feature during the installation routine; ignore the RM386 incompatibility warnings you're likely to see. You'll also need to edit the system's MSDOS.SYS file. First, change BootGUI=1 to BootGUI=0; then add the line Logo=0. That way, you'll be able to install Windows 95 from floppy disks—if you have the time and patience.

BUG BRIEFS

PROBLEM

► If you're using WordPerfect 6.1 and are trying to put a subscript and a superscript on the same line—as you'd do if you use the scientific notation for chemical elements in your work—the numbers may appear in the wrong horizontal positions.

► After the change from daylight savings time to standard time last fall, you may have noticed that your Day Runner Planner for Windows was having trouble telling time. For example, a 1:30 P.M. appointment would turn up in the 2:30 P.M. slot on the printed calendar.

SOLUTION

Get the program's PerfectOffice patch in one of four ways: call your technical-support number, try the company's bulletin board (801-225-4414), download from the Internet at <http://ftp.wordperfect.com>, or get the patch from CompuServe from Library 17.

Day Runner has addressed the time problem and is mailing all registered owners of the software updated disks that correct it. With this software fix, you won't show up an hour late to your meetings anymore—unless you want to.

LOOKING AHEAD

Tell me what you love and hate about these products and we'll share the information in future issues. Color ink jet printers • Digital cameras • Flowcharting pro-

grams • The IBM ThinkPad 760 CD • LANtastic for OS/2 • Multifunction peripherals • Quad-speed CD-ROM drives • SoftWindows • Windows 95 Utilities •

ZDS Z-NoteFlex. Contact Brian Nadel directly via MCI Mail (556-1500), CompuServe (72241,1616), or on the Internet at bnadel@zd.com.

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New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Melissa J. Perenson

Taking Charge of Your Accounts

WITH THE RELEASE OF ONE-WRITE PLUS VERSION 5.0 FOR Windows, NEBS has finally brought its popular accounting software into the Windows age. This \$69.95 package is a full-featured accounting



FACE-LIFT: One-Write Plus has a new user-friendly interface.

program with General Ledger, Check-writing, Billing/ Invoicing, Accounts Receivable, Accounts Payable, Bank Reconciliation, Payroll, and Budgeting modules.

Peachtree Software's update of Peachtree Accounting for Windows Release 3.5 adds a host of small-business accounting features. The \$129 package includes over 75 sample business templates, as well as multimedia tips

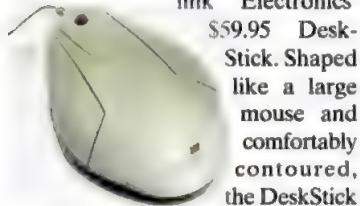
on how to get your books straight. Also added are business management tools and enhanced reporting capabilities.

One-Write Plus Version 5.0 for Windows. List price: \$69.95. NEBS, Nashua, NH; 800-388-4344, 603-880-5100; fax, 603-881-3745. *Circle 412 on reader service card.*

Peachtree Accounting for Windows Release 3.5. List price: \$129. Peachtree Software, Norcross, GA; 800-247-3224, 404-564-5800; <http://www.peach.com>. *Circle 413 on reader service card.*

A New Base for Pointing Sticks

IF YOU'VE GROWN TO LIKE the eraser-head pointing stick in your notebook, you'll love Interlink Electronics'



\$59.95 Desk-Stick. Shaped like a large mouse and comfortably contoured, the DeskStick

guides your cursor by using a pointing stick and is ideal for desks with limited space. It has large buttons and a comfortable angle, plugs into a serial or PS/2 port, and uses standard mouse drivers.

DeskStick. List price: \$59.95. Interlink Electronics, Camarillo, CA; 800-340-1331, 805-484-1331; fax, 805-484-8989. *Circle 423 on reader service card.*

PHOTOGRAPHY BY THOM D'CONNOR

HOT PROSPECT

Vivacious Colors

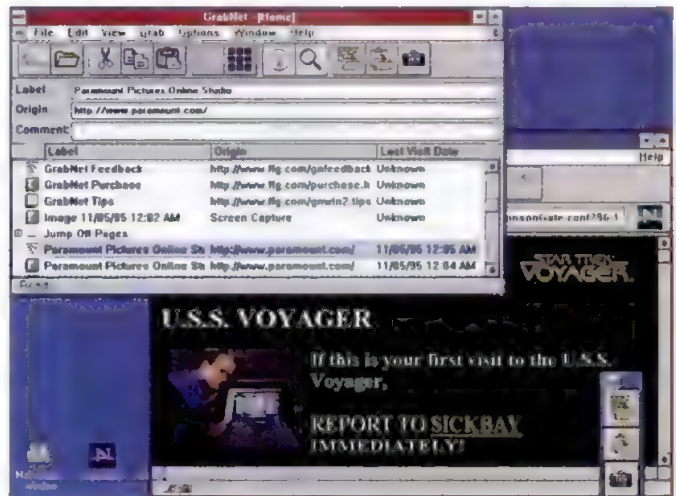
Do you want the vividness of a color printer, but are still hesitant about buying an ink jet model? Well, Citizen America Corp. takes nonlaser color printing to new heights with the \$599 Printiva 600C.

The sleekly designed Printiva uses a printing process called Micro Dry, which builds on the thermal fusion technology used in Citizen's portable printers. Cartridges use heat and pressure to bond a dry, pigment-based resin ink to the paper. The output is completely waterproof and smear-resistant.

The four color cartridges are a no-mess snap to replace and cost \$69 each. The standard black, cyan, magenta, and yellow cartridges together use a four-color process to produce up to 16.7 million colors. Resolution is 600 by 600 dots per inch (dpi) for color, and 1,200 by 600 dpi for monochrome. Red, blue, and gold cartridges are available. The Printiva also supports color metallic foil printing.

Although the output quality is impressive, the unit's print speed is only 2 pages per minute for text, and color output is significantly slower. There's a 100-sheet feeder and a variety of paper stocks and sizes may be used.

Printiva 600C. List price: \$599. Citizen America Corp., Santa Monica, CA; 800-477-4683, 310-453-0614; fax, 310-453-2814. *Circle 409 on reader service card.*



WEB WORKER: GrabNet 2.0 captures elements from your favorite Web pages.

Mining Gold on the Internet

THE FOREFRONT GROUP HAS two World-Wide Web browser add-ons that will greatly assist you in organizing and sorting

through your downloads, as well as with accessing favorite pages. Both are designed for use with Netscape Navigator 1.1 or later and other popular browsers.

GrabNet 2.0 is a \$19.95 productivity enhancer (available for free with the purchase of the other add-on, WebWhacker) that helps you gather, view, and file information from Web pages. The program lets you grab elements from Web pages—including images, text, and URLs—and store them on your local desktop.

Take a machete to the Web with WebWhacker, a \$49.95 add-on that downloads Web pages in their entirety to your desktop, mirroring their original format—including all images and graphics elements. The downloaded pages and images are relinked locally. This is real boon for those who'd like to browse a page off-line or retain the page for future use.

GrabNet 2.0. List price: \$19.95. **WebWhacker.** List price: \$49.95. The ForeFront Group Inc., Houston, TX; 713-961-1101; <http://www.ffg.com>. *Circle 410 on reader service card.*

The Ascent of The Ascentia

AST RESEARCH'S ASCENTIA 950N/120 packs impressive power, assuming you don't require an integrated CD-ROM drive in your notebook. Starting at \$3,449, the 950N/120 features a 120-MHz Pentium processor, 8MB of RAM, either an 800MB or a 1.2GB removable hard disk, 256K of L2 cache, a 10.4-inch active-matrix or dual-scan display at 800-by-600 resolution, an internal 3.5-inch floppy disk drive, one Type III PC Card slot, and an MPEG chip set for video-playback capability.

The 6.4-pound unit also includes 16-bit audio, a lithium ion battery, an integrated pointing stick, an IrDA wireless port, an integrated microphone and speaker,



MOVIE MACHINE: The Ascentia 950N/120 has built-in MPEG.

and jacks for audio line-in/line-out, microphone, and headphone.

AST Ascentia 950N/120. List price: Starting at \$3,449. AST Research Inc., Irvine, CA; 800-876-4278, 714-727-4141; fax, 800-926-1278. *Circle 424 on reader service card.*

Video Editing with a Real Impact

AVID TECHNOLOGY'S \$2,995 REAL IMPACT PROVIDES A HIGH-end 32-bit video editor designed for use with a Targa video board and Microsoft Windows NT. The PCI-based software is targeted at producers of multimedia video content for presentations, videos, CD-ROMs, and interactive training. Real Impact offers full-motion, 30-frame-per-second video editing; the ability to synchronize video and audio; and a storyboard creator to help you plan and arrange your project. There's support for most popular video and graphics formats.

Real Impact. List price: \$2,995. Avid Technology Inc., Tewksbury, MA; 800-875-4699, 508-640-6789; fax, 508-640-9486. *Circle 417 on reader service card.*

The Four-by-Four CD Brigade

NEC TECHNOLOGIES' \$279 MULTISPIN 4X4 CD-ROM CHANGER is a quad-speed, four-disk changer designed to fit into a standard 5.25-inch floppy disk bay. Designed like a car's audio CD player, the sleek MultiSpin 4X4 has no tray or caddy; instead, the CDs are pulled in by the unit's roller mechanism. The drive includes software that assigns the MultiSpin's four CD slots either as four separate drive letters—useful for multidisk games and references—or as a single drive letter. The 4X4 has an access time of 250 milliseconds (ms).

Nakamichi America Corp., which provides the changer mechanism for the NEC drive, is also releasing a four-disk quad-speed CD-ROM changer. The \$299 MJ-44 is an IDE/ATAPI drive that operates with four separate drive letters. The device includes native drivers for all major operating systems. Disks are drawn into the four internal slots, where they are held firmly so that the drive may be used either vertically or horizontally.

Alps Electric is taking a different approach. The \$495 Alps 4X Internal CD-ROM Changer provides a removable four-disk magazine that lets you group your CD-ROMs appropriately, so that your encyclopedias, reference items, or multidisk games are all accessible at the same time. The magazines, which cost \$25 apiece, work in conjunction with the included software to provide a cataloging system for your CD-ROM collection. The drive fits into a 5.25-inch bay and has a 750-ms change time.

MultiSpin 4X4 CD-ROM Changer. Estimated street price: \$279. NEC Technologies Inc., Boxborough, MA; 800-632-4636, 508-264-8000; fax, 800-366-0476. *Circle 420 on reader service card.*

MJ-44. List price: \$299. Nakamichi America Corp., Torrance, CA; 310-538-8150; fax, 310-324-7614. *Circle 421 on reader service card.*

Alps 4X Internal CD-ROM Changer. List price: \$495. Alps Electric (USA) Inc., San Jose, CA; 800-825-2577, 408-432-6000; fax, 408-432-6035. *Circle 422 on reader service card.*



JUKEBOX CD-ROMs: A trio of CD-ROM drives holds up to four disks.

BRIEFS

Hardware

With prices starting at \$30,885, **Sony's** RTE-3000 real-time MPEG-1 encoder speeds the multimedia developer's production of MPEG CD-ROMs (800-635-7669) **International Products Management's** \$149 Compudial computer headset lets you control phone functions directly from the computer keyboard (800-969-8655) **MicroNet Technology's** internal Master CD Plus is a double-speed CD-recorder that costs \$979 (714-453-6100) **Boffin Limited** has a \$499 quad-speed version of CD-Siete, a seven-disk

CD-ROM jukebox with stereo output (612-894-0595) **Creative Technology's** \$249.99 Sound Blaster AWE32 PnP uses Creative's Advance Wave Effects wavetable synthesis for hundreds of realistic instrument sounds and effects (800-998-5227) **Clary Corp.'s** \$149 DataSave Plus, Version 7.1, provides power management and diagnostic capabilities for Windows 95 and Windows NT (800-442-5279) **Pacific Image Electronics' \$749 ScanAce II** is a 30-bit color flatbed scanner that supports 600-by-1,200-dot-per-inch optical resolution (310-214-5281) **New**

Media Corp.'s \$200 28.8 WinSurfer is a V.34 PC Card fax modem that doesn't consume any power from the battery while in standby mode (714-453-0100).

Software

APTE's \$49.95 Internet Coach for Netscape Navigator provides a personal trainer to walk you through the basics of navigating the Internet (708-866-1872) Though designed for law students and legal professionals, many armchair legal watchers will also appreciate **CLE Group's The Interactive Courtroom** on

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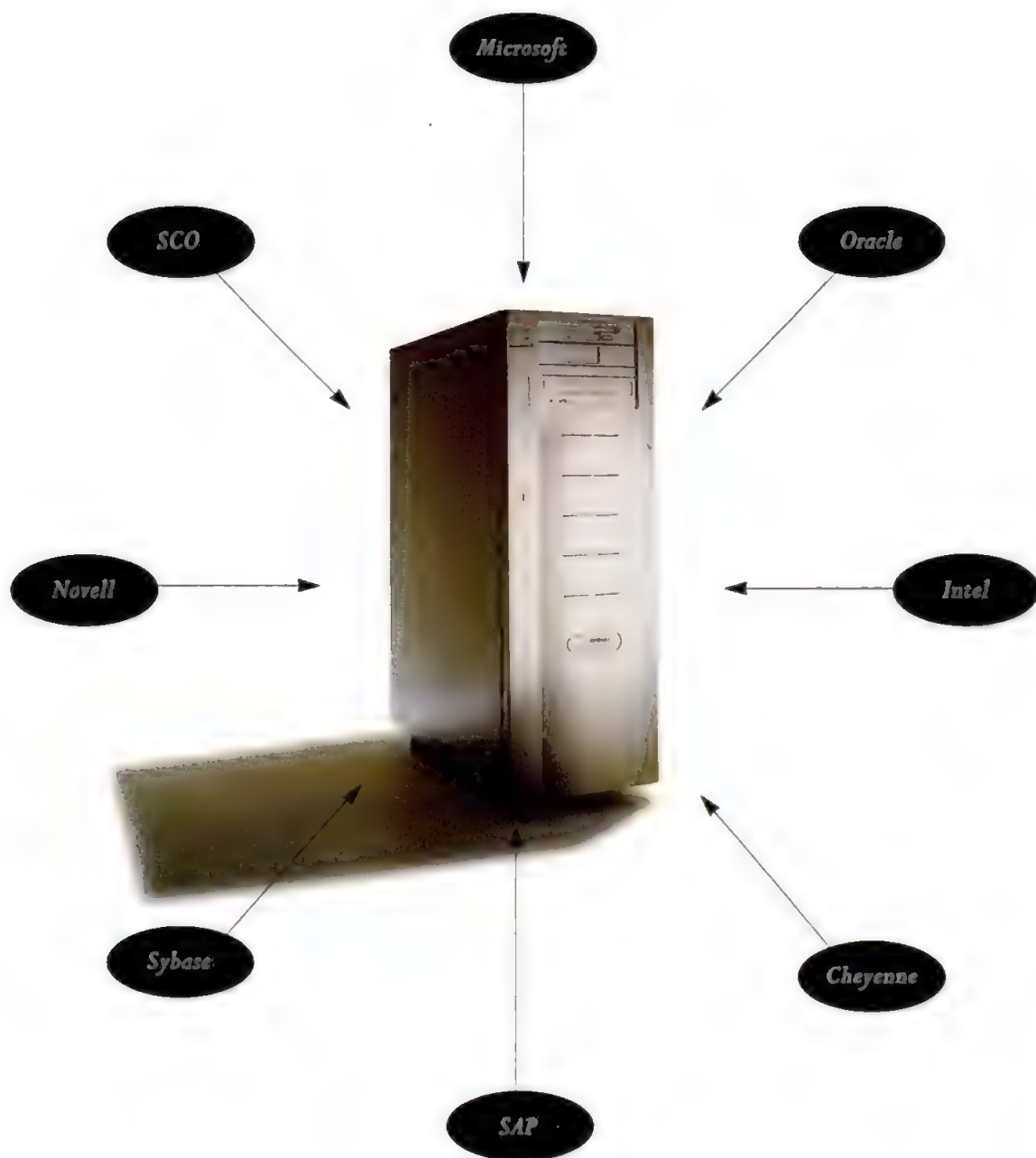
In Canada: call 1-800-390-8464. Canadian E.R.P. \$199. **There is a \$9.95 charge for shipping and handling. ©1995 Micrografx, Inc. All rights reserved. All product names are trademarks of their respective companies.

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You see, they may be Compaq servers. But they are Compaq-Microsoft-Oracle-SAP-Intel-Novell-SCO-Sybase-Cheyenne solutions. (We just couldn't fit all those logos on them.)

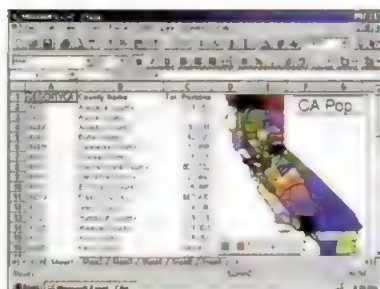
The Compaq logo, featuring the word "COMPAQ" in a bold, red, italicized sans-serif font.

Has It Changed Your Life Yet?

Mainstream Geoanalysis

DETAILED MAPS AND demographic and market data once cost thousands of dollars. But that's no longer the case thanks to MaconUSA's \$99 Maps and Data for Microsoft Office 95. Maps and Data takes advantage of Excel 95's built-in mapping abilities to provide comprehensive maps, market and demographic data, and analysis. There are over 1,000 high-resolution U.S. and world maps that include information such as ZIP codes, county boundaries, highways, waterways, airports, landmarks, and census tracts. There are also over 200 data topics ranging from population, age, and marital status to income, housing, and sales data.

Maps and Data for Microsoft Office 95. List price: \$99. MaconUSALLC, Allston, MA; 617-254-2295; fax, 617-254-2883. e-mail, maconusa@msn.com. *Circle 439 on reader service card.*



COMPUTER CARTOGRAPHY: Maps and Data makes it easy to link demographic info with detailed maps.

Crush the Competition

WITH THE \$499 CRUSH CD-ROM marketing seminar, you get a tool that Hands-On Technology hopes will help you do just that to your competitors. With Crush, you can analyze and understand the competition—as well as your own strengths and weaknesses. Crush's database, tips, and market visualizations let you see the big picture. The software also helps you to delineate the steps necessary for your company to take a competitive

stance. Combining theory with practice, Crush includes numerous tips from marketer Regis McKenna. Based on your input data, Crush's database helps you come up with customized strategies for success. The program is linked to Hands-On Technology's World-Wide Web page at <http://www.hot.com>.

Crush. List price: \$499. Hands-On Technology, Burlingame, CA; 800-772-2580; fax, 415-579-7739. *Circle 419 on reader service card.*



A Multipurpose PC Card

SUFFERING FROM A SHORTAGE of PC Card slots? Fujitsu Microelectronics has multifunction PC Card that help stretch those slots. The \$349 LAN/SCSI Combo card provides a Type II, Plug and Play, hot-swappable card with a 10Base-T LAN connection and SCSI-2 compatibility. Fujitsu also offers standalone

SCSI (\$169) and 10Base-T and 10Base-T/2 LAN Adapter cards (\$169/\$199), as well as a \$269 Stereo Sound Card with 16-bit sound.

LAN/SCSI Combo. List price: \$349. Fujitsu Microelectronics Inc., San Jose, CA; 800-642-7616, 408-922-9000; fax, 408-954-1309. *Circle 416 on reader service card.*

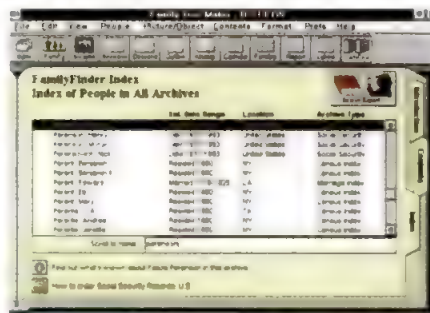
Charting a Family's History

WANT TO DIG INTO YOUR FAMILY'S ROOTS? COMMSOFT brings its powerful genealogy program, Roots IV, to Windows with the \$59.95 Visual Roots for Windows, which helps you trace and chart your family's history. You can create slide shows with audio and video recordings, images, and scans. You can also generate a variety of reports.

Broderbund Software's \$60 FamilyTree Maker Deluxe Edition, Version 3.0, goes further by aiding your research. The searchable FamilyFinder Index lists over 115 million individuals; there's also a list of government resources.

Visual Roots for Windows. List price: \$59.95. CommSoft Inc., Windsor, CA; 800-327-6687, 707-838-4300; fax, 707-838-6373. *Circle 414 on reader service card.*

FamilyTree Maker Deluxe Edition, Version 3.0. List price: \$60. Broderbund Software Inc., Novato, CA; 800-474-8696, 415-382-4770; fax, 415-382-4419. *Circle 415 on reader service card.*



FAMILY FINDER: Search FamilyTree Maker's index to chart your family tree.

BRIEFS

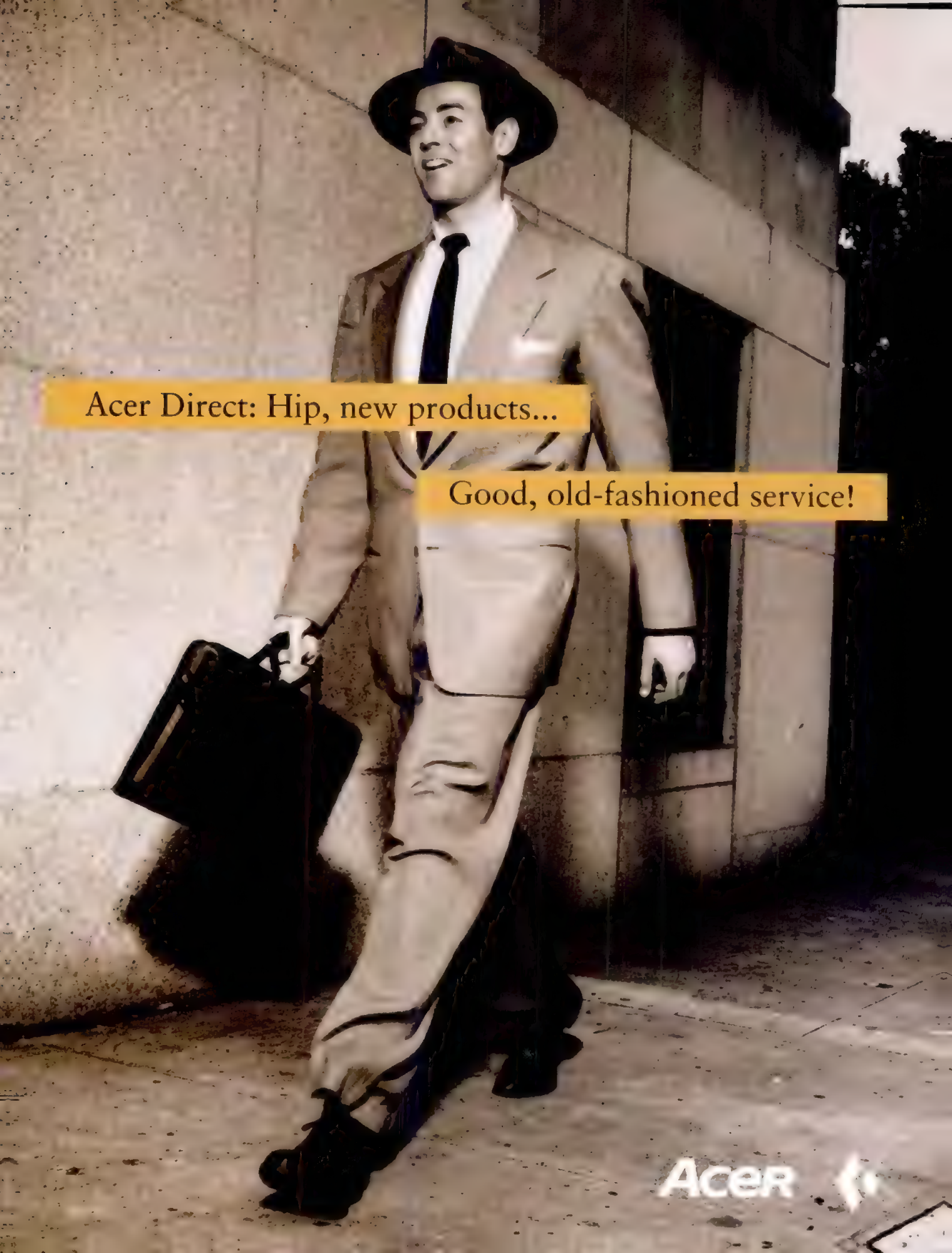
CD-ROM, a \$395 package that puts you in the center of a digitized mock court (800-373-1829) If you write annotated research papers, try **Personal Bibliographic Software's** \$345 ProCite 3.1 for Windows, which automatically links in-text citations within a Windows document to a ProCite Database (313-996-1580) Send brief messages in a flash with **ADM Group's** \$299 QuickFlash 2.5; an alternative to sticky notes and message pads, this version adds PhonePads, which notify you if someone is holding on the line or called in your absence (212-371-4900).

Utilities

The Azalea VampireXT from **Azalea Software** is a \$99 utility that eases the transition from Adobe PageMaker to QuarkXPress by retaining text and graphics formatting (303-229-0620) **Oakley Data Services** offers SmartChecker, a \$19.95 Windows utility that lets any Windows spreadsheet audibly read back rows and columns of figures (<http://www.smartcode.com>) Add multimedia to Microsoft's PowerPoint presenting software with **Gold Disk's** \$49 Instant Multimedia for PowerPoint (800-835-5889).

Books

Written by the creators of Yahoo!, David Filo and Jerry Yang, **Yahoo! Unplugged** is the story of the birth of the popular World-Wide Web directory and a comprehensive survey of 100,000 Web sites sorted by subject. (\$39.99, IDG Books, 800-434-3422) From "AAA Trip Planner" to "Zurk's Rainforest Lab," **The Anders CD-ROM Survey 1996** is a compilation of user reviews of more than 600 titles in a format reminiscent of the popular Zagat restaurant guides (\$9.95, Andiron Press, 617-739-0244).

A man in a light-colored suit, white shirt, dark tie, and a dark fedora-style hat is walking towards the left. He is carrying a dark briefcase in his right hand. The background is a stone wall and a sidewalk.

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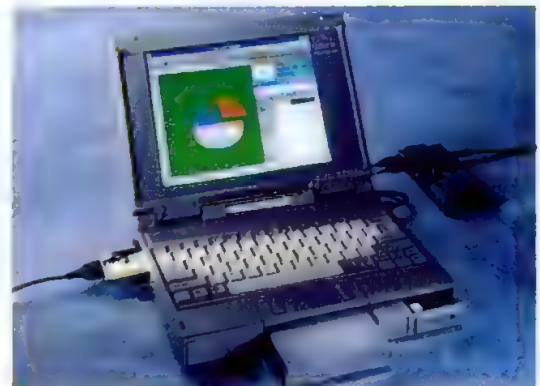


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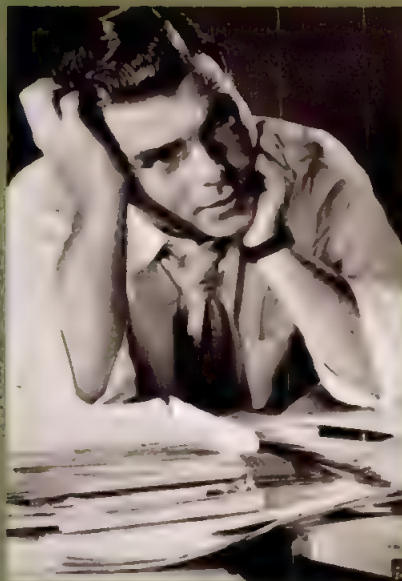
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PC Magazine - Sept. 12, 1995, on the SyncMaster 17GLi and 17GLi monitors.



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Communicus Interruptus

You're heading to the conference room for a meeting. As you step through the door, a shrill alarm sounds. In surprise, you jump back. Your boss's assistant fixes you with a steely stare. Reluctantly, you hand over your cellular phone. You step back

through the portal; the alarm sounds again. Your pager, please. Having cleared the electronic gate, you enter the room to see one of your associates emptying the contents of her purse onto a tray. She's allowed to keep her electronic organizer. At the table, another coworker is bemoaning the newly empty PC Card slot on his subnotebook, until recently occupied by a two-way radio mail card. You smile to yourself. At least your PDAs and notebooks will be able to communicate during the meeting via their IRDA ports. Your face falls, however, as the boss plunks an infrared jammer onto the table and begins the meeting.

Welcome to the wireless world of the not-so-distant future. We can hope that meeting organizers won't have to resort to such Draconian measures to get and keep our attention, but it's not looking all that good. In our leaner, meaner business environments, fewer of us have someone to answer the phone for us. Despite voice mail, many people feel impelled to answer the phone whenever it rings, setting aside the concerns of anyone else who might be in our offices. People are so enslaved to their electronic gadgets that they'll willingly, even eagerly, suspend virtually any other activity to whip out their flip phones or consult their pagers' screens. They listen or study intently for a moment, then announce to all in earshot some portentous message, such as "Microsoft is up %."

Electronic distractions are ubiquitous, and not just in business. Casio sells an electronic organizer and a data watch, both equipped with infrared ports and capable of exchanging alphanumeric messages. They're targeted at young teens, with the heavily implicit message in the advertising that the kids will be able to exchange messages during class. What ever happened to whispering and passing notes? Many schools ban the devices, but I've got to wonder about the priorities of a company or a marketing executive who would sell such a product, never mind the common sense of a parent who would buy the thing for their kids. What's next—private TVs in the shape of textbooks so the kids can keep up with Sally Jessy?

Where will you find shelter from this electronic pelting, this constant bombardment of compulsive communication? Will you vacation on some Club Med island that isn't under any SkyTel satellite's footprint, where cellular base stations are banned? Will blocking services and store-and-forward arrangements become more common?

Obviously, we can't trust ourselves to turn the darned things off or leave them at home. How many times, after all, have you heard the urgent bleat of a pager or the seductive trill of a phone while you're dining or at a movie? If your house has burned down, it really doesn't matter whether you find out about it now or an hour from now.

I'm not some Luddite who wishes that pagers and cellular phones would go away. They've made an invaluable contribution to our ability to communicate, even as they've institutionalized a form of rudeness based on interruption. We haven't even begun to see the real penetration of these devices into our lives as they become smaller and even more ubiquitous. The credit card-size pager is here, as is the one built into a Swatch. Once voice-response technology becomes sufficiently miniaturized, cellular phones won't even need buttons.

We want to be masters of the technology, not the other way around. We're still a long way from ubiquitous electronic communication, single phone numbers and access codes, and global directories. Pagers are a reality, and one of the best ways to manage communications with

them is with Integra's WinBeep (800-905-5062), a comprehensive communications package that gives you full access to modern pagers' alphanumeric features. Integra also has a number of middleware products that fit between your communications applications and Microsoft's mail protocols. Integra has come up with an interesting adaptation of its technology—a business card on a floppy disk. Someone hands you a disk, you install it, and you get an icon. Any time you click on it, you get an input box that's hard-wired to the person's pager service and PIN. It sounds like an intelligent way to harness the inherent power of pagers. What the person does with your message is his business. □



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CIRCLE 117 ON READER SERVICE CARD

The Reemergence of Convergence

There is never a shortage of hyped-up technology at Comdex, and the recent Fall Comdex was no exception, with yet another "convergence" being touted. If you recall, over the years there have been many of these faddish so-called convergences that

were supposed to take place between the computer and *(insert your favorite technology here)*. For a couple of years it was the computer and the television. Now it's the computer and the telephone. Telephony was the buzzword heard most at Comdex. Folks, this is another dog waiting to bark.

This latest convergence concept promises to meld computer, telephone, and pager into one cool unit that will be with us wherever we go. It seems to be cropping up everywhere because some study done by some bonehead researcher says that people don't want laptops; instead, they want small palmtop computers with built-in cellular phones. I have been unable to identify the source of this delusion, but I have been assured over and over that it's for real.

This harkens back to a couple of years ago when ex-Northgate honcho Art Lazere showed he was ahead of his time by promoting a laptop-like computer that had a phone handset attached to the side. I thought this was a clunker of an idea back then and think no better of it now. If you listen to the promoters of this concept, the ideal system would be a Toshiba Portégé 610CT with a handset glued to the side and a big antenna. The idea is for you to hold this monstrosity to your ear and see what happens when you are spotted making a call.

"Jimmy, that man is crazy, don't get near him!"

Of course, not all iterations of this have to be so big. I was shown one unit at Comdex that was essentially a large pocket cell phone with a four line display. It acted as a smart cell phone, PC, and smart two-way pager using the packet cellular network. The concept was that you could send messages back and forth, just like e-mail, with the two-way pager.

So, the guy showed me the demo and it went like this: First he was going to show how he could send a message to my Internet mailbox. For some reason he couldn't do it. But that was all right: I didn't need the message anyway—I was sitting right there. So, he moved on to feature number two, which was answering some alphanumeric pager e-

mail. I looked at the little screen and scrolled through a test message received. So far, so good. Now the guy wanted to send a response using the telephone keypad as a keyboard. He made sure to point out that a real keyboard could be attached to this device, too; I suppose this is for those of us

who carry keyboards everywhere we go. Anyway, to acknowledge the message he began punching away at the keypad. Each key can be up to three letters, so you have to screw around with the thing to get the right letter to come up. Punch, punch, punch. . .

After about 5 minutes of watching him struggle with this I started thinking, "Why doesn't he just make the call—he's holding a phone." Apparently, the appeal of this gizmo is that it's cheaper *not* to make the call and instead use the packet-cell-message thing. Let's see, I'm going to spend \$1,000 or more for this computer/phone/pager to save about \$5 in telephone cell charges while wasting hours trying to get the message coded in and out of the device? Where's the logic in that?

"This is what people say they want," I've been told.

Who says they want this? As far as I'm concerned, the only people who need pagers are doctors, criminal lawyers, and drug dealers. I know there are other jobs that actually require pagers, but they don't coincide in totality with the huge numbers of pagers in actual use. The pager companies would have you lasso your children with these devices so you

could page them whenever you wanted them home, as if they can't read a clock and come home on their own.

My concern is that people are too easily being talked into these electronic tethers, which keep them perpetually at work. Does every office worker need to be so plugged in that he can be contacted (a.k.a. bugged or summoned) 24 hours a day? Do the inventors of these things think a device like this is a good idea? And why would anyone voluntarily submit themselves to using such a device? I'm shocked by the drooling people do over these things, as if they are "cool." Hopefully, this latest iteration of the ball and chain will be rejected as soon as it comes to market. Just say no! □

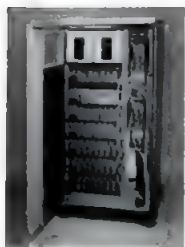


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CIRCLE 309 ON READER SERVICE CARD



Inside Track

Comdex was bigger than ever with over 200,000 in attendance. Las Vegas was more crowded, too, but the gambling was all taking place in the exhibit hall, especially with lame Internet exhibits. This audience is a little **too sophisticated** to be impressed by Web browsers written over a three-day weekend. Only the rubes were impressed.

It seemed as if the parties and entertainment were escalated to a higher level than ever before. There were **events up the wazoo**. Fleetwood Mac, Lyle Lovett, and Donna Summer were some of the headliners giving concerts sponsored by various companies. The most notable event of the show, though, was sponsored by the **Panda Project**, a group of ex-IBMers who make some spectacular servers. Obviously frustrated by IBM's old ways, these guys broke the mold for Comdex events. The Panda Project chartered a jet and flew a large group of people to Palm Springs, California, where they were carted to Liz Taylor's mansion. There, they were treated to a **gourmet feast** while watching a private Dana Carvey stand-up routine. Then the company flew them back.

Some observers felt Comdex had less people than before. But if you asked the hoteliers, they would say the place was **jammed like never before**. This anomaly was caused by more and more action taking place off the show floor. Demonstration suites were everywhere, and most of the best business was done off the floor. The **best new technologies** were hidden in these suites—a trend that Comdex promoters aren't crazy about, I'm sure.

This year saw the opening of a **monorail** that connected the MGM Grand with Bally's, but the town desperately needs a better people mover to get everyone from the hotels on the strip to the downtown convention center. The roadways are a mess, cab lines can easily extend to 100 people or more, and the line to take a shuttle from the main convention hall to the Sands convention hall was so deep, **I stopped counting**. Vegas once planned to run a monorail from the airport to downtown, but special interest groups (cabbies?) stopped the plan. There is no excuse to let this **horrible snarl** continue.

It was clear that **the buzz** over new Windows 95 software is **dead and buried**. Nobody cared much about any new Windows 95 software from what I could tell, except in the Microsoft booth. Maybe vendors are finally realizing that their support of the Microsoft OS strategy eventually means Microsoft will own all major categories of software. Only Autodesk seems immune, and how long will that last?

*It was clear that the
buzz over new
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Nobody cared
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software, except in the
Microsoft booth.*

But it seemed as if everyone else was looking to create a new trend. There was plenty of buzz over the various **flat-panel plasma displays** shown by Fujitsu, Panasonic, and Sony, with the 42-inch Fujitsu clearly the best of the lot. And the SD Disk—formerly known as the DVD—was a **big hit** with all the vendors promising units by late summer. There is no question that this thing will be the **hottest technology** we've seen for years. There was a unified booth containing a lecture on the subject, and all the major Japanese manufacturers were showing mock-up units. These **fake units** were beautifully designed, and I consider them in and of themselves to be a trend. In this industry we've never had the automotive equivalent

of a concept car, but these fake players and recorders come pretty close. They looked great.

Other Things of Interest Dept: Virtual I-O, the Seattle company that brings you those nifty 3-D LCD eyeglasses, was showing a complete hard disk-based computer the size of a beta video cassette. The idea was that you could plug in a keyboard and the video headset and finally have that computer-without-a-screen concept that we've been promised. Perfect for someone wanting **genuine privacy**, although I think once we start seeing a plane load of people all wearing virtual reality headsets, the world becomes a little creepier.

Printers did not go unnoticed. LaserMaster, the king of high-resolution printing, has upped the ante with its monstrous color printer/plotter. It prints a **52-inch wide image** on a continuous roll for as long as you want the image, until the roll runs out. A **new solid ink technology** makes the image even more stunning and more permanent. These guys do good work! Highly recommended.

Most Interesting Rumor Dept: Supposedly, Microsoft is quietly wooing Hitachi and has **secretly ported Windows 95** to the Hitachi 32-bit RISC processor. It hopes to have Casio build and market a small RISC computer about half the size of the Newton in an attempt to open up the market for those little hand-held, do-all gizmos that seem to be attracting a lot of attention in Japan. This is being developed by the same group who did the Timex/Microsoft watch, I'm told. When I pressed on whether this will really be Windows 95 or Windows NT with a Windows 95 shell, I was told it will be plain-vanilla Windows 95 **stripped down** to fit on a smaller platform. If Microsoft ports plain Windows 95 to other chips, this will not sit well with Intel.

Maybe this thing is the wallet computer that Gates keeps **mumbling** about in his more recent speeches. □

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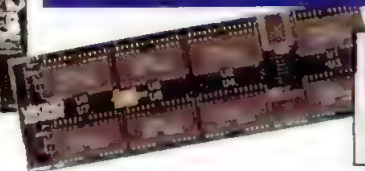


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CIRCLE 239 ON READER SERVICE CARD

And a CD-R Drive on Every Desk. . .

The concept of "important" new PC products isn't a simple thing. Some important products make their mark with new, groundbreaking technologies. The first Apple LaserWriters and HP LaserJets fall in that category. Other products address human-

factors issues—achieving an ease of use heretofore unknown in a product category. Visioneer's tiny PaperPort desktop scanners exemplify that brand of "importance."

Finally, a very few move onto that short list of products earning high-water marks in the evolution of our use of PCs by combining solid technologies with marked ease of use, and packaging and delivering these user-friendly technologies at prices so unexpectedly low that they redefine how a market segment works—and sometimes how we work as well.

My pick for hardware product of the year for 1995 falls squarely in that last group. It's Hewlett-Packard's new sub-\$1,000 HP SureStore CD-Writer 4020i, which hit the stores in October and is still riding high. At about \$995, it's an expensive internal 4X CD-ROM drive. But it's a very low-priced 2X CD-R CD-ROM *writing* device. Also, HP delivers the drive in a complete, ready-to-install kit.

It's a well-made, high-quality product—no surprise, coming from HP—but the real story doesn't lie in its specs or in its quality. The key to the importance of the 4020i is that price point—and how by delivering this level of performance at a market-busting price, HP is going to start a wave of change in PC users' work habits.

I wrote here a year ago ("Record Your Own CD-ROM," February 21, 1995) about my enthusiasm for CD-R drives, and how useful they are for nearly any serious PC user. But when decent CD-R drives cost \$4,000 to \$6,000—just the case only a few months ago—not very many of us were destined to have one on our desks. Writing a CD-R across a network can be problematic—the high sustained data-transfer rate required for successfully "burning" a CD-R is an iffy thing on a heavily used network—so shared CD-R drives aren't good answers; and proliferating \$4,000-to-\$6,000 local drives is not in the cards in very many offices. Nor in many homes.

The 4020i will make CD-R drives commonplace in desktop PCs. CD-R blanks have dropped in price, too, and are widely available for \$8 to \$9. As drive prices continue to fall (probably to the \$500 level by year-end), we're on our way to seeing CD-R drives installed in most new PCs

sold—exactly what it took, remember, to make standard CD-ROM readers as ubiquitous as they are today.

Rolling your own CDs can change how you work. One example: backups. Instead of dealing with backup tape—a slow, linear medium that requires a highly nonstandard piece of equipment for reading files, thus making your own restores a pain and distributing data to others via tape nearly impossible—any CD-ROM backup disk you make is instantly readable on any of the many millions of CD-ROM drives in use.

Including your own. Which means restores, when needed, are fast and easy (and possible to *any* machine, not just your own, if it's really broken). It also means that now it becomes possible to move less-used files off your hard disk and onto a small library of CD-R disks you keep at your desk—your own on-line library of instantly available files that once had to remain on your hard disk if you ever realistically expected to use them again. That will prove for many an effective brake on their accelerating demand for more disk space, a big help in the era of fat Win 95 apps and fat data files.

Another example: easy distribution of data. When you need to send a chunk of data to others and it's larger than you can conveniently zip onto a few floppy disks or send over a public or private network, how do you send it? On \$20 Iomega ZIP disks? On \$50 to \$100 SyQuests? Very useful devices, to be sure, but don't assume the folks on the

other end have the same device you have. What if you sent them a CD-R disk? At a media cost of about \$10 for 650MB, an unbeatable penny and a half per megabyte versus the \$0.20-per-megabyte cost of a ZIP disk or the \$0.50-to-\$1.00-per-megabyte cost of SyQuests? And in a form they're highly likely to be able to use?

Other vendors deserve credit here, too: Pinnacle, Sony, and others cut their prices deeply to match HP's and are now players in the under-\$1,000 CD-R drive market HP created. But as it did with its first LaserJet printer a decade ago HP has just defined a new and fundamental change in how we use PCs. Product of the year indeed, HP. □



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CIRCLE 286 ON READER SERVICE CARD

The Well-Equipped Road Warrior

When it comes to portable computing, there is image, and then there is reality. You've seen the ads. They show someone carrying a notebook computer and an uncluttered briefcase and wearing that life's-a-peach smile. In the background, you invariably

see a Gulfstream III jet or a scenic ocean bluff or a hotel room nicer than most of us will ever stay in—all clues that this is just an illusion.

Then there's reality. Fact is, if you're carrying your laptop on the road, you can expect to haul along a bag stuffed full of accessories plus a bunch of paperwork—none of which would even begin to fit into the tiny briefcase shown in ads.

But don't despair. With the right set of equipment, you can be prepared to handle just about anything on the road, without adding too much bulk or weight. Here are my recommendations on what accessories the well-equipped road warrior should be carrying these days.

NOTEBOOK NECESSITIES

I carry two PC Card modems because I believe it's a matter of when and not if a PC Card modem will fail. Your company probably has a sizable inventory of unwanted, first-generation 2,400-bps card modems. Think of them as space-saving spares. I also keep an extra dongle (the \$30 modem-to-RJ11 adapter) stuffed in the bottom of my shoulder bag.

I carry two phone-line cords (you'll notice I carry two of a lot of things). One is an 18-foot coiled cord, the longest you can buy. My second cord used to be a shorter, straight cord, but recently I've been using a retractable, 8-foot flat cable in a credit card-size housing, such as CommLink for \$15. It's tough to say whether it's really helpful or just a gimmick because truth be told, it doesn't save much space or time compared with a straight cable. But it looks cool.

You probably already carry an in-line coupler that makes one long phone cord out of two short ones. Tip: When you put your line cord away, use the coupler to connect the two ends to protect the delicate levers on the cords from snagging and breaking. Be sure to carry a modular duplex jack, or Y-connector, that lets you plug two phone cords into one wall or phone jack. I also have a \$23 Modem Saver digital line-tester (it looks like a fat pencil that has an RJ11 plug for a tip) that warns you if the line you think is analog is actually digital (and could therefore

zap your modem). The Modem Saver is from IBM (\$23).

On international trips, I pack two works-on-any-phone adapters in addition to country-specific phone and power adapters. One is an acoustic coupler (\$149) that works, even on pay phones, at speeds up to 28.8 Kbps depending on line conditions, according to the manufacturer, Konexx Inc. The other is a \$159 connector that plugs into the phone's handset jack—the preferred way to deal with digital phones that don't have RJ11 jacks.

Seldom do I carry a portable printer. Instead, I borrow a printer in someone's office, or print via modem to the hotel fax machine. When I do carry a printer, my choice is the Canon BJC-70, a compact color marvel, though its overly large external power pack is bound to draw attention at airport security.

I have two AC transformers (about \$100 each), and in my car, I keep a paperback-size AC inverter from StatPower that turns 12 volts DC into 120 volts AC (the 100-watt model is about \$100). You can get much smaller laptop-specific 12-volt adapters for about \$100, but only for the best-selling models.

WHERE TO GET IT

As a mobile computer user, you face two problems: first, knowing that these gadgets exist, and second, finding out who sells them. Here are some good sources: Mobile Planet (800-675-2638) has a broad range of road warrior accessories,

as does TeleAdapt (408-370-5105). Laptop-bag maker Port (800-242-3133) has also expanded into the business. Magellan (800-962-4943) sells travel gear of all sorts, including some laptop accessories. Konexx Inc. (formerly Unlimited Systems) can be reached at 800-275-6354. For the Modem Saver, call IBM at 800-388-7080.

One accessory I would dearly love to see is a universal transformer that can power and recharge a laptop computer, a cellular telephone, a portable printer, a portable CD-ROM drive, and a portable audio CD player. Technologically it's feasible. All we need is someone who thinks it's financially feasible. □



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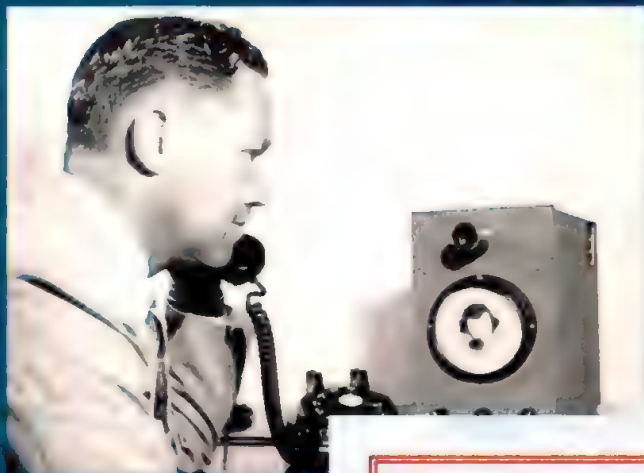
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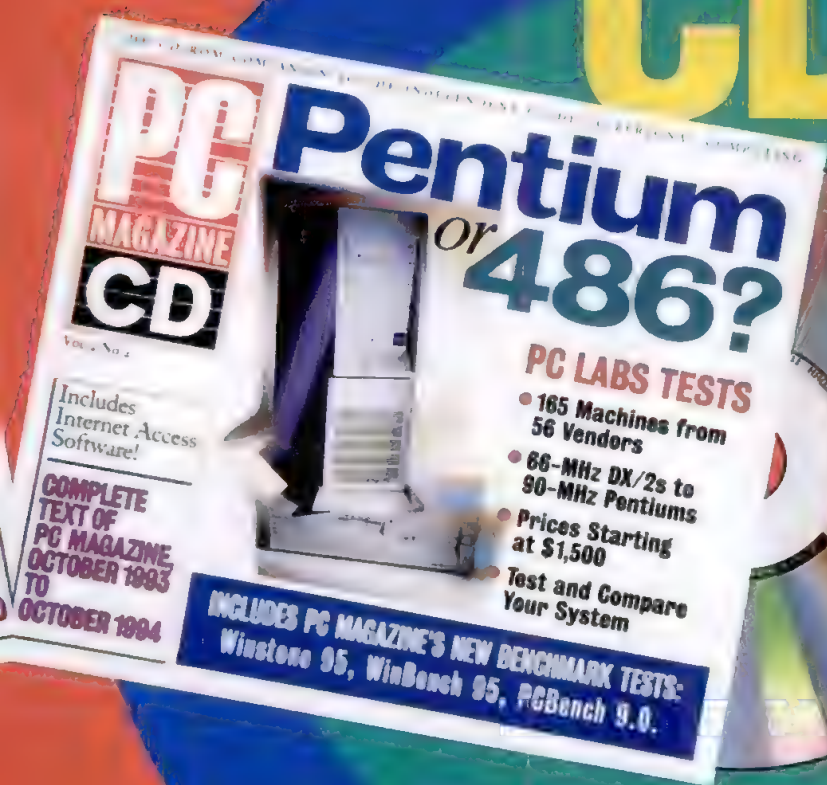
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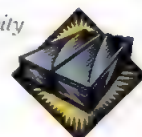
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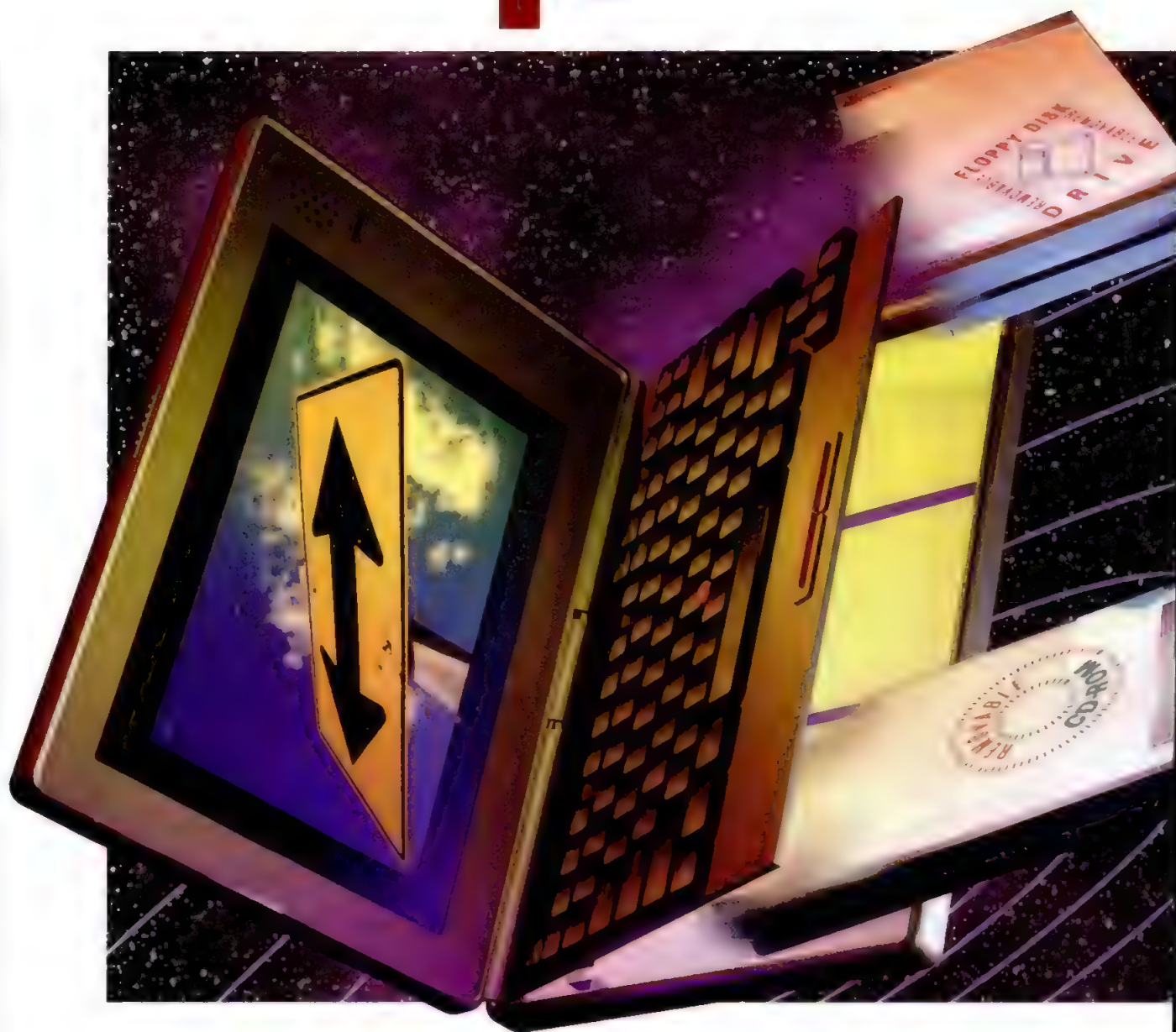


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COLOR PENTIUM NOTEBOOKS

ON THE ROAD WITH THE PENTIUM

ILLUSTRATION BY JACK HARRIS/VISUAL LOGIC



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Desktop PCs still hold a power advantage over mobile units, but these notebooks offer all the power you'll need and more.

When veteran notebook users talk about "the gap," they're not talking about David Letterman's dental features; they're talking about performance. The gap refers to the performance drop you can expect when you switch from a high-powered desktop PC to a top-of-the-line notebook. This performance penalty remains a fact of life for demanding road warriors, even in this roundup of 41 color Pentium notebooks.

Fortunately, this gap has narrowed as portables have edged their way up the PC performance scale. The choice used to be between a muscle desktop and an anemic portable.

By Robert S. Anthony

Today the choice is between a superpowered desktop and a just-plain-powerful mobile system.

Many of the shortcomings of notebooks, such as the 640-by-480 LCD-resolution limit, have been addressed in the 41 units reviewed here. But other performance bottlenecks remain, such as the use of 32-bit graphics chip sets instead of more robust, desktop-level, 64-bit chip sets.

CHIPPING AWAY

In the past, Intel's top-of-the-line Pentium CPU has been used exclusively in desktop PCs and servers. For example, in our

notebook roundup of August 1995, the most powerful Pentium CPU used was the 100-MHz version, even though 120-MHz and 133-MHz Pentium CPUs were readily available in desktops.

In this roundup, however, every available Pentium speed is represented, from 75 MHz to 133 MHz. As expected, first-generation 60-MHz and 66-MHz Pentium CPUs, though still available, are not being used in notebooks because of their larger die size and battery-draining 5-volt power requirement.

MOBILE MUSCLE

Keep in mind that some Pentiums are better optimized for mobile use than others. All 75-MHz and faster Pentium CPUs employ a superset of Intel's *SL Technology*, which—among other things—allows the CPU clock to shut down when not needed and allows parts of the CPU to be shut off completely when possible, thus cutting down on power requirements. But Intel's new *Voltage Reduction Technology* (VRT) allows 75-, 90-, and 120-MHz

RECENT REVIEWS

PC, Come Home

December 19, 1995.....page 136
32 home PCs.

A Pentium for Every Desktop

December 5, 1995.....page 102
103 machines in total: 20 Windows 3.1 machines and 83 Windows 95 machines.

PowerPC: A Work in Progress

October 24, 1995.....page 185
3 PowerPC units compared with a 133-MHz Pentium PC.

Mobile Pentiums to run at 2.9 volts internally and 3.3 volts externally.

Intel also offers versions of its 75-MHz, 90-MHz, and 120-MHz Pentiums either in a standard ceramic package or in its unique *Tape Carrier Package*, which the company describes as a "postage stamp-size package for the microprocessor that is thinner than a dime." This package saves a good deal of motherboard real estate over what would be

needed for a standard chip and a socket. VRT versions of these CPUs are available in both ceramic (also known as *pin grid array* or PGA) and TCP packages.

In fact, we were able to test two identical WinBook XP5s (Pentium/90 systems), one using a ceramic-package CPU and the other using a TCP CPU with VRT. The TCP/VRT CPU lasted about 14 percent longer on our WinDrain battery test than the ceramic package.

The desktop versions of Intel's 120-MHz and 133-MHz Pentiums, while not specifically designed for mobile use, have some advantages over their mobile cousins. First off, their die size is smaller. These 3.3-volt chips were the first designed with the 0.35-micron manufacturing process. The original 60-MHz and 66-MHz Pentium CPUs were made with a much larger 0.8-micron design. All other Pentiums use a 0.6-micron process. The smaller die size translates into lower power requirements and less heat.

Two machines in this roundup—the HyperData Media Go CD-Note and the

Picks and Pans: Color Pentium Notebooks

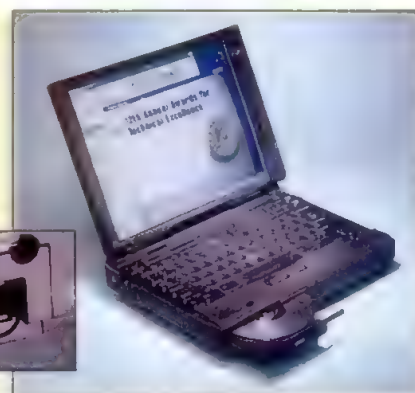


▲ READY TO ROLL WITH WINDOWS 95:
With Gateway 2000's new Solo S120, not only do you get a copy of Microsoft Office 95 but you get an easy way to jump-start your apps with the keyboard's Windows 95-specific keys.



◀ HEFTY TRAVELING COMPANION:
The ACW SoundPad IIB P5-133 DS ran for 2 hours 55 minutes on our WinDrain battery test but only with a clunky, 1.4-pound external battery clamped on, which brings this portable's travel weight close to 9.3 pounds (floppy disk and CD-ROM drives are external and not included in the weight).

▶ YOU'LL FIND EVERYTHING you could possibly want in a notebook inside the 8.4-pound \$7,924 IBM ThinkPad 760CD. The 12.2-inch screen gives you about the same amount of viewing area as a 14-inch desktop monitor. The quad-speed CD-ROM drive lets you take advantage of the ThinkPad 760CD's built-in MPEG-2 support, and its telephony features—including a 28.8-/14.4-Kbps data/fax modem, full-duplex speakerphone, and answering machine capability—will keep even the most demanding road warrior in touch.



Sharp PC-3060—use the Pentium-class CX5x86 chip from Cyrix Corp. The HyperData unit uses a 120-MHz version, which is aimed from a performance standpoint at the 90-MHz Pentium-level market, while the Sharp notebook uses a 100-MHz version, which is targeted at the 75-MHz Pentium class.

After we completed this roundup, Intel was poised to release 150-MHz and 166-MHz Pentium processors for desktops and a VRT version of the Pentium/133. Don't expect to wait long before these CPUs show up within the confines of a notebook shell. Intel also intends to design a mobile version of the new Pentium Pro processor in 1997.

CACHING UP

In the past, when we asked vendors about the lack of external processor cache in their notebooks, the reason we were given was the same: Cache memory drains power. The trade-off in performance versus battery life was appropriate for 486-based systems. But Pentium systems benefit much more from L2 cache—and vendors know it. Most of the Pentium notebooks in this roundup (and in our roundup of August 1995) include L2 cache.

CD-ROM DRIVES GO MAINSTREAM

Less than one year ago, only a handful of portables featured built-in CD-ROM drives. Now, however, they're quickly becoming just another notebook peripheral. In fact, 24 of the notebooks in this roundup include a CD-ROM drive, many in a modular format that lets you swap the CD-ROM drive for another component, such as an extra battery, floppy disk drive, or second hard disk. The usefulness of a CD-ROM drive on the road has been enhanced by a new wave of CD-ROM financial, information management, telephone-number database, and travel software. And for those of you who already own a notebook sans CD-ROM but don't want to invest in another portable with a built-in CD-ROM, help is on the way. By the end of 1995, we expect to see one or more sub-1-pound portable quad-speed drives shipping from vendors such as Panasonic, joining already shipping double-speed drives such as Sony's 10-ounce Data Discman. These products will give

IBM ThinkPad 760CD Toshiba Portégé 610CT Toshiba Satellite Pro 400CDT

This roundup of Pentium notebooks has shown us that a new era in mobile computing has begun: an era in which you don't have to sacrifice much power when

you take your show on the road. Our three Editors' Choices indeed bear out this claim. Not only are they powerful, but their component lists read like those of well-stocked desktop PCs—only these machines fit into your briefcase.

The IBM ThinkPad 760CD (\$7,924 street price) is not only an Editors' Choice recipient here, it was also a winner of our 1995 Award for Technical Excellence. One glance at this portable and you'll realize why. This system features a 12.2-inch active-matrix display, which provides about the same viewing area as a 14-inch desk-

top monitor. Add to this a 90-MHz Pentium CPU, 256K of pipelined-burst processor cache, a 1.1GB hard disk, a quad-speed CD-ROM drive, and a built-in 28.8/14.4-Kbps data/fax modem that supports full-duplex speakerphone and answering machine functions and you have a fully loaded mobile office in an 8.4-pound package (travel weight).

Our second Editors' Choice recipient, the Toshiba Portégé 610CT (\$4,678 list), is truly in a class by itself. In case you're looking for an ultraportable Pentium notebook, the Portégé 610CT is the only such system on the market today. Weighing in at only 5.5 pounds fully equipped for the road, the Portégé

610CT features a 90-MHz Pentium CPU, a 9.5-inch active-matrix display, 16MB of EDO DRAM, 16-bit stereo audio, a lithium ion battery, and a 687MB hard disk. This notebook lasted nearly 3 hours on our heavy-usage-scenario WinDrain battery test; under normal computing conditions, you should expect even longer life.

Another entry from Toshiba, the Satellite Pro 400CDT (\$4,678 list price), is our third Editors' Choice winner. Its spec sheet reads like that of a high-end portable: 75-MHz Pentium CPU, 10.4-inch active-matrix display, 776MB hard disk, quad-speed CD-ROM drive, and lithium ion battery pack, proving that you don't have to break the bank to get a complete portable solution.

We also found three systems worthy of honorable mention. Either the Gateway Solo S120 (\$5,999 street) or the Toshiba Tecra 700CT (\$5,999 list) would be a great choice if you're looking for a power portable complete with a Pentium/120 CPU and a CD-ROM drive. At \$5,378 (list), Toshiba's Satellite Pro 410CDT is a bit more expensive than its Editors' Choice-winning sibling, but it has a speedier Pentium/90 CPU and an 11.3-inch SVGA display.

CD capabilities to portables lacking internal drives.

In terms of data throughput, however, notebooks are still a generation behind their desktop counterparts. All but 4 of the 24 CD-ROM-equipped notebooks here had double-speed drives. Only the IBM ThinkPad 760CD and 3 of Toshiba's systems (the Satellite Pro 400CDT, Satellite Pro 410CDT, and Tecra 700CT) offered quad-speed CD-ROM drives. Desktop PC makers largely abandoned

the use of double-speed CD-ROM drives about a year ago and have moved to 4.4X, 6X, and even 8X drives.

VIDEO PERFORMANCE

The secret of tweaking desktop-level graphics performance out of a notebook remains an elusive one indeed. Even though local-bus graphics subsystems are now standard on top-of-the-line notebooks, we've yet to see a mainstream color notebook display that could chal-



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	575e	5120e	5100	5133
Processor	Pentium 75MHz	Pentium 120MHz	Pentium 100MHz	Pentium 133MHz
Std./Max. Memory	8MB/136MB	8MB/136MB	16MB/192MB	16MB/192MB
Hard Drive	630MB or 1GB	630MB or 1GB	630MB or 1GB	1GB
Cache Internal	16KB	16KB	16KB	16KB
Cache External	256KB (optional)	256KB (optional)	256KB	256KB
Architecture	PCI	PCI	TriFlex/PCI	TriFlex/PCI
Video Memory/Max.	1MB/2MB	1MB/2MB	1MB/2MB	1MB/2MB
Compaq 150 Color Monitor	Yes	Yes	Yes	Yes
Diskette Drive	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB
Expansion Slots (Total)	3	3	4	5
Drive Bays (Total)	3	3	4	5
Ports: Serial/Parallel	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)
Security Features	Yes	Yes	Yes	Yes
Processor Upgradable	Yes	Yes	Yes	Yes
101-Key Keyboard, Mouse	Yes	Yes	Yes	Yes
Software Preinstalled (Choice of)	MS-Windows® 95 or MS-Windows 3.1	MS-Windows 95 or MS-Windows 3.1	MS-Windows 95 or MS-Windows 3.1	MS-Windows 95 or MS-Windows 3.1
Energy Star Compliant	Yes	Yes	Yes	Yes
Limited Warranty*	3-Year	3-Year	3-Year	3-Year
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HIGHLIGHTS

Color Pentium Notebooks

Though the 41 Pentium-class notebook systems in this review are more powerful than ever and cover the processor gamut from 75 MHz to 133 MHz, they still can't measure up in all respects to the best desktops have to offer. Average performance for the best notebooks now trails that of the best desktops only by a narrow margin, but until 64-bit graphics accelerators and faster LCD technologies are available for notebooks, this gap will remain.

High-resolution color is becoming a must-have feature on high-end notebooks. Of the 41 notebooks here, 17 offer 800-by-600 Super VGA internal resolution, and 12 of those are active-matrix screens. Large displays are also hitting the mainstream: 6 systems had screens larger than 11 inches, and 1, the IBM ThinkPad 760CD, offered a brilliant 12.2-inch, SVGA active-matrix display.

lence even low-end desktop graphics subsystems in terms of speed.

The performance limitation of double-speed CD-ROM drives combined with slow LCDs was quite noticeable when we informally tested the CD-ROM drive-equipped notebooks with a handful of video clips. Some of the video clips that ran with television-quality smoothness on the machines in the roundup of Pentium desktops in our issue of December 5, 1995, were noticeably shaky when we ran them on even the best-performing notebooks.

The best performer in this roundup on our Graphics WinMark 96 tests was the HP OmniBook 5000 CTS. The PCI-based unit came with 256K of pipeline-burst cache and 1.5MB of video EDO DRAM and used OPTi's new Viper 558N Pentium-PCI chip set.

OPTi's Viper-N chip set series supports Pentium processor speeds of 120 MHz and beyond, bus speeds up to 66 MHz, and pipeline-burst L2 cache. Most of the seven units here that used this chip set posted high scores on our Graphics WinMark 96 tests. In the HP OmniBook 5000 CTS, this chip set was combined with Chips & Technologies' 65545 graphics chip set.

BIGGER, BRIGHTER, SHARPER

No, size isn't everything, even in a notebook, but the systems in this roundup

Not all CPUs are created equal: Some processors handle power management better than others. Look for portable units whose processors feature Intel's new Voltage Reduction Technology, which allows mobile Pentiums to run at 2.9 volts internally and 3.3 volts externally. We've found that notebooks with these CPUs have up to 14 percent longer battery life than portable systems with standard processors.

CD-ROM drives are more common than ever. In this roundup, 24 notebooks either had CD-ROM drives built-in or offered a modular design that allows you to swap a floppy disk drive, extra battery or other component for a CD-ROM drive. Most notebooks, however, are still a generation behind desktop systems: Only four of the CD-ROM drives were quad-speed units; all others were double speed.

show that vendors are still working hard at putting desktop-size screens in their notebooks.

The king of the hill in this roundup is the gorgeous 12.2-inch active-matrix color screen on the IBM ThinkPad 760CD. With a top internal resolution of 800-by-600, you end up with quite a bit of real estate on the screen. Other contenders with big screens and Super VGA resolution include FutureTech Systems' FutureMate 5513D with its 11.5-inch dual-scan color screen, ARM Computer's Arm TS50CD with its 11.3-inch LCD panel (dual-scan), Toshiba's Tecra 700CT (11.3-inch active-matrix panel), and Zenith Data Systems' Z-Note GT (11.3-inch active-matrix screen).

Super VGA displays are no longer a rarity among Pentium notebooks. Here, 17 units supported LCD resolutions of 800-by-600. It pays, however, to look closely at screen specifications. Of the 17 units with 800-by-600 displays, 5 of them used dual-scan color screens, which, of course, don't offer the richness and contrast of active-matrix displays.

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TRADING PLACES

Modularity is definitely in as an anchor design feature in today's top-of-the-line notebooks. This is good news for road warriors who can't decide between a built-in floppy disk drive and an external CD-ROM drive.

Notebooks with removable modules allow you to swap one peripheral for another easily. Many of the systems here allow you to swap a CD-ROM drive module for a floppy disk drive module or a second battery, the latter being a tremendous benefit on long flights.

Unfortunately, as with notebook batteries, there are no standards for notebook modules. Rest assured that the CD-ROM drive that you remove from Brand X's notebook is not going to be usable in Brand Y's.

NO MORE CARD GAMES

Ask any owner of an old notebook about the torture entailed in installing a PC Card (also known as a PCMCIA card) and you might get a war story worthy of any veterans' convention. Old PC Cards required users to endure the torture of configuring software drivers, COM port addresses, and initialization strings before you could use them. In many cases PC Cards were incompatible with certain brands of notebooks and simply would not work. In August 1995, however, relief arrived in the form of Windows 95.

Now that most new notebooks support Plug and Play technology, installing today's generation of PC Cards under Windows 95 requires little more than inserting the card in a slot. If a specific driver for your PC Card device isn't available, a generic one usually works.

SOUNDING OFF

Sound Blaster-compatible FM-synthesis stereo audio is no longer a rarity on high-end notebooks; it's as standard an item as the LCD screen itself. Only three units here—the three Latitudes from Dell Computer Corp.—lacked audio subsys-



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HDD	520MB	520MB	810MB	520MB	810MB	1.3GB
MONITOR	10.4" Dual Scan color	10.4" Dual Scan color	10.4" Active Matrix color	10.4" Dual Scan color	10.4" Active Matrix color	10.4" Active Matrix color
WARRANTY	2 year	2 year	2 year	3 year	3 year	3 year
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CIRCLE 033 ON READER SERVICE CARD

tems and speakers. If you play MIDI sound files often, you might want to take a hard look at the 12 units that offered wavetable sound support. Sound boards based on wavetable sound samples deliver relatively true-to-life simulations of standard musical instruments.

All of the audio-capable systems we reviewed offer 16-bit audio chip sets except NEC Technologies' NEC Versa 4050C, which offers a lower-grade 8-bit sound system.

While many of the notebooks we tested offer built-in microphones, the quality of these devices differs widely. In many cases the sound of the hard disk, processor fan, or CD-ROM drive motor adds a good deal of background noise to any recordings made with the built-in microphone. Also, only a handful of notebook systems we looked at in this roundup offer telephony and speakerphone functions.

REVIEW CRITERIA

To participate in this roundup, we asked vendors to supply notebooks with a 75-MHz or faster Pentium or Pentium-class processor, 16MB of RAM, a 500MB or larger hard disk, and a dual-scan or active-matrix color display. We also re-

quired that Windows 95 be installed on the hard disk, and we asked the vendors to supply docking stations or port replicators where available. Modems and integrated audio systems were optional. If the notebook used a modular design, we asked that all modules, such as CD-ROM drives, floppy disk drives, and extra batteries, be supplied with the machine.

When you look at our requirements for this roundup, you'll note that they look a lot like the requirements for a mid-level desktop. Add the fact that many of the reviewed units came with 1GB or larger hard disks; and you realize how little you give up in features if you make one of these systems your main PC.

With the level of performance that you can get from these notebooks, does it make sense to make one your main computer and simply retire your desktop? Employees at some corporations aren't being given the choice. Those who once had access to a desktop and a notebook PC now have one system: a notebook with a docking station or port replicator and a full-size keyboard and a desktop monitor. While this setup works fine for many people, those with high-level graphics or large storage requirements might find such a setup limiting.

Notebook computing has yet to catch up to the best desktops in terms of performance, but chances are awfully good that the Pentium notebooks here are more

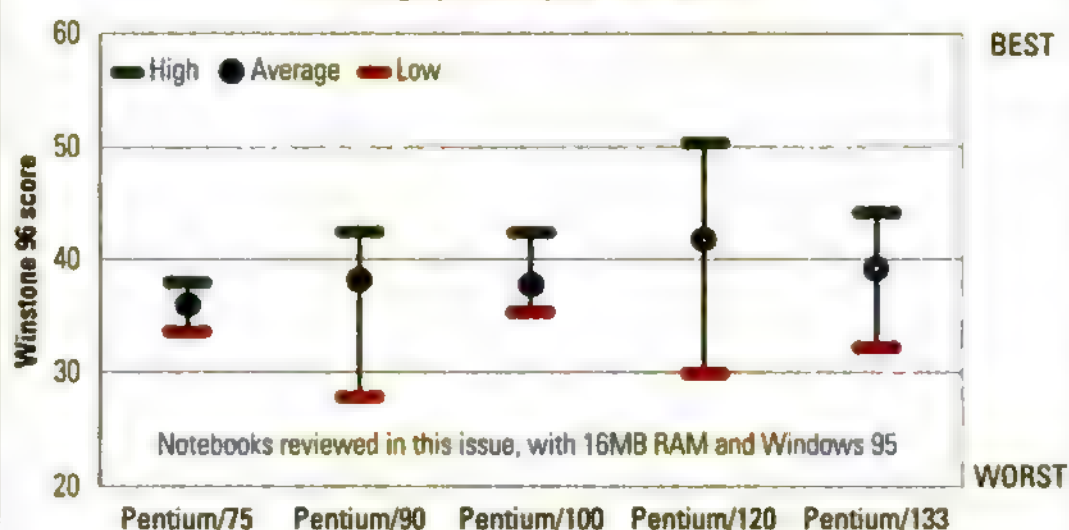
DISAPPEARING ACT

Among the notable companies missing from this roundup were ZEOS, which declined to participate; Canon and Panasonic, which weren't shipping units with Windows 95 installed in time for this roundup; and Digital Equipment Corp., which was between revisions of its notebook line and did not have a Pentium or Pentium-class portable at the time we were testing.

EARLY-RETIREMENT OPTION

System Performance by Processor Type

A speedy CPU alone does not necessarily translate into a top score on our Winstone 96 tests. L2 cache, a hard disk with a fast rotational speed, and a top-notch graphics chip set also count.



COLOR PENTIUM NOTEBOOKS

How to Read the Suitability to Task Boxes

Suitability To Task

Scores reflect how well a product fares for particular types of functions or operations. These ratings do not take the prices into account. From best to worst, the possible ratings are *excellent*, *good*, *fair*, and *poor*.

The **desktop replacement** rating indicates how well each notebook serves as a substitute for a desktop PC. Factors contributing to this rating include display resolution and size, hard disk capacity, performance, and the availability of a docking station or port replicator.

The **road warrior** rating indicates how well the notebook is suited for prolonged use on the road.

Key factors in this category are battery life, travel weight, case dimensions, performance, screen size, keyboard, and the inclusion of an integrated fax modem.

SUITABILITY TO TASK

Product Name

Desktop replacement	Good
Road warrior	Fair

Service and Reliability

Ratings are included for vendors that received at least 50 responses in our latest poll of 17,000 subscribers. These results reflect readers' experience with all notebook PCs from a given vendor. For details, see our issue of July 1995.

The **reliability** rating is a measure of respondents' satisfaction with the

reliability of the vendor's machines in use over the past two years.

The **repair** rating is a measure of respondents' satisfaction with the repair service provided by the vendor for machines in use over the past two years.

SERVICE & RELIABILITY

Company Name

Reliability	Better than average
Repair	Average
Technical support	Worse than average
% needing repair	Average

The **technical support** rating is a measure of respondents' satisfaction with the vendor's support for notebooks in use over the past two years.

The **percent needing repair** rating is a measure of the proportion of machines that respondents indicated needed repair in the first year of use.



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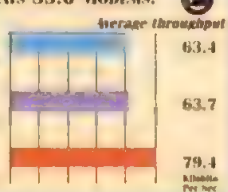
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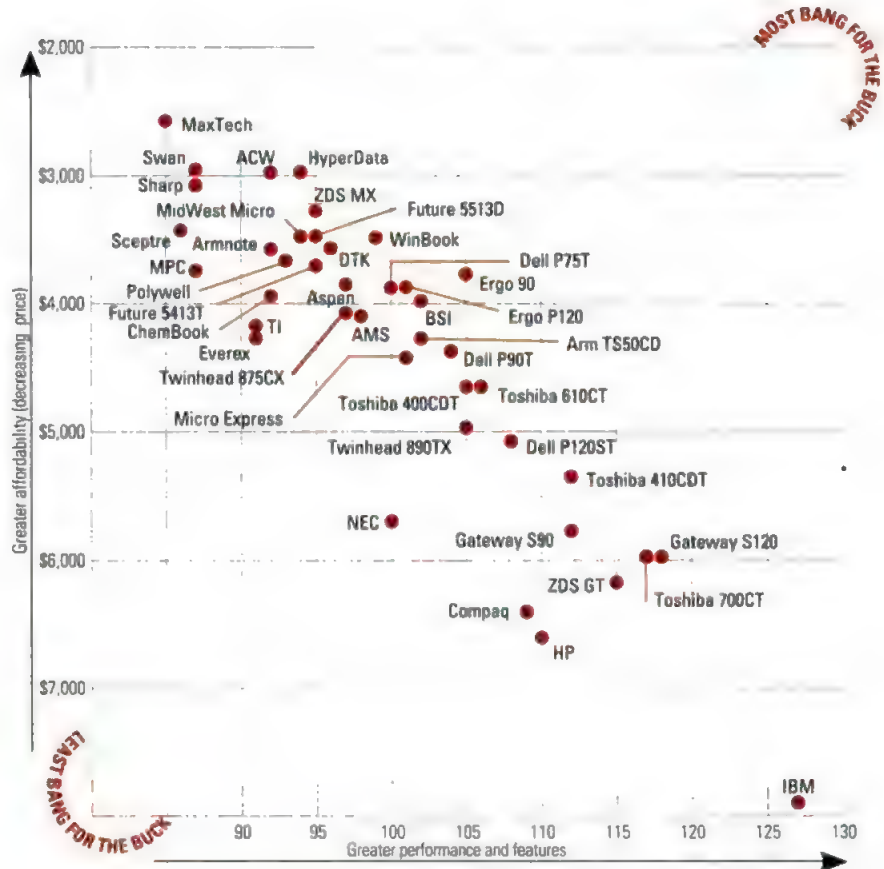
Price/Performance Index: Color Pentium Notebooks

The \$7,924 (street price) IBM ThinkPad 760CD, from IBM Personal Computer Co., is by far the most expensive machine we tested for this roundup. But this Editors' Choice portable's performance features score stands out from the crowd as well. Weighing in at 8.4 pounds equipped for the road, the ThinkPad features an extraordinary 12.2-inch Super VGA display, a quad-speed CD-ROM drive, and a built-in 28.8/14.4-Kbps data/fax modem. Two infrared ports, a tilting keyboard, and an extensive software bundle complement the unit's top-notch benchmark test performance. If price is no object, the ThinkPad is worth serious consideration.

The Toshiba Satellite Pro 400CDT, another recipient of our Editors' Choice award, strikes an impressive balance among price, performance, and features. A solid performer, the \$4,678 unit features a 75-MHz Pentium CPU, a 776MB hard disk, and a quad-speed CD-ROM drive. The Satellite Pro 400CDT also offers a bright, 10.4-inch active-matrix screen, FM- and wavetable-synthesis sound capability, and an internal AC adapter (just a cord to carry; no brick required), all at a travel weight of only 7.6 pounds. (All the Toshiba units' prices are list prices.)

Two other notebooks, also from Toshiba, come close to the Satellite Pro 400CDT on our price/performance chart: the Satellite Pro 410CDT and our third Editors' Choice winner in this roundup, the Portégé 610CT. The \$5,378 Satellite Pro 410CDT has the same travel weight as the 400CDT but offers an increase both in processing power, to a 90-MHz Pentium, and in screen size, to 11.3 inches. (This display also supports 800-by-600 SVGA resolution.)

At 5.5 pounds (travel weight), the \$4,678 Portégé 610CT is the lightest notebook in this roundup. But let the Portégé's diminutive size fool you: This machine is a powerhouse and was



one of the top-performing 90-MHz Pentium units we tested. Thanks to its lithium ion battery, it also proved its mettle on our WinDrain battery test with the second-longest battery life—2 hours 51 minutes. The Portégé 610CT also boasts EDO DRAM, a 687MB hard disk, and 16-bit audio that supports FM synthesis.

Two other notebooks, one from Ergo Computing and one from WinBook Computer Corp., also rise above the crowd. The \$3,795 Ergo PowerBrick 90 weighs 7.9 pounds equipped for travel and offers a 10-inch active-matrix screen, a built-in 14.4-Kbps fax modem, and good performance. The WinBook XP5 combines average performance, a 10.4-inch active-matrix display, a 776MB hard disk, and an internal 14.4-Kbps fax modem for \$3,509 (street price).—Analysis written by Mary E. Behr

THE DATA POINTS

Scores on our Winstone 96, CD-ROM WinMark 96, and WinDrain battery tests account for about 40 percent of the performance/features score. Display technology, diagonal screen size, and maximum external resolutions supported make up over 15 percent. Service policies, including length of warranty, availability of on-site service and 24-hour, 7-day support, and vendor results on our Service and Reliability survey, make up 13 percent of the score. Other features and components account for the remainder of the performance/features score.

Price/performance data is available in the Hardware Library of the Editorial Forum on PC MagNet under 02BANG96.TXT and on the World-Wide Web at <http://www.ziff.com/~pcmag/pclabs/pclabs.htm>.



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ACW SoundPad IIIB P5-133 DS

At \$2,999 (street price), the ACW SoundPad IIIB P5-133 DS is one of the least expensive notebooks in this roundup. This 133-MHz Pentium system is targeted at the power user, but its performance was well below average.

This system did post an impressive 2:55 time on our WinDrain battery test, thanks to its two nickel hydride batteries—one internal and one external that screws onto the back of the machine. But this battery life comes with a price: The second battery bumps the notebook's travel weight up to 9.3 pounds.

The SoundPad IIIB comes with both a light external CD-ROM drive and a light external floppy disk drive (both included in the above price). It also comes with a 10.4-inch dual-scan SVGA screen, 256K of asynchronous L2 cache, FM-synthesis-capable sound, and built-in speakers.

The SoundPad IIIB was a very poor performer on our benchmark tests. The scores that this Pentium/133-based machine garnered on our Windows-based tests were all below the average scores

posted by the Pentium/75 group.

All Computer Warehouse provides a one-year parts-and-labor warranty. On-site service is \$89.95 for one year.
—William P. Flanagan

ACW SoundPad IIIB P5-133 DS. Estimated street price: \$2,999. All Computer Warehouse, City of Industry, CA; 800-775-1953, 818-369-4181, fax, 818-961-7462; e-mail, acw@net-voyage.net.

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AMS PowerCD

AMS is targeting all types of portable users with the \$4,125 (list price), 100-MHz Pentium-powered AMS PowerCD. This notebook was an average performer on our benchmark tests, but its appeal is diminished by a 9-pound travel weight and a relatively short 57-minute battery life.



AMS PowerCD.

The PowerCD we tested had a 751MB hard disk and a 10-inch active-matrix display. The double-speed Philips ATAPI CD-ROM drive is a fixture in the unit. The PowerCD has an integrated microphone and speakers, but AMS includes a set of 5-watt external speakers as well. The notebook also includes two Type II or one Type III PC Card slot, NTSC video in and out, and an integrated 14.4-Kbps fax modem.

The PowerCD comes with 256K of asynchronous L2 cache. Compared with the two other 100-MHz systems in this review, the PowerCD posted competitive scores on all Windows-based tests. Objective and subjective video testing showed some dropped frames.

The unit's sub-1-hour battery life can be improved by adding a second nickel

SUITABILITY TO TASK

ACW SoundPad IIIB P5-133 DS

Desktop replacement	Fair
Road warrior	Good



ACW SoundPad IIIB P5-133 DS.

SUITABILITY TO TASK

AMS PowerCD

Desktop replacement	Good
Road warrior	Fair

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Byte Magazine rated Sceptre's Soundx Multimedia Pentium Notebook "Best Overall". Byte Magazine stated, "Sceptre's Soundx..... excels in overall performance..... it's just the system to meet future demands..... we awarded the best color-quality to Soundx"

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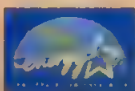
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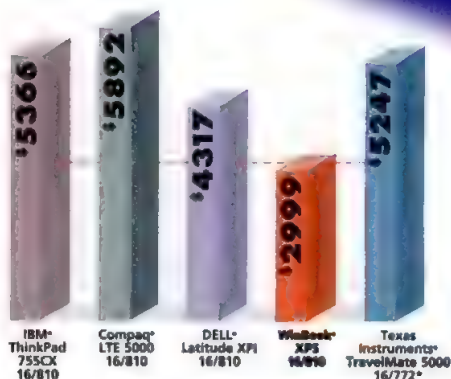
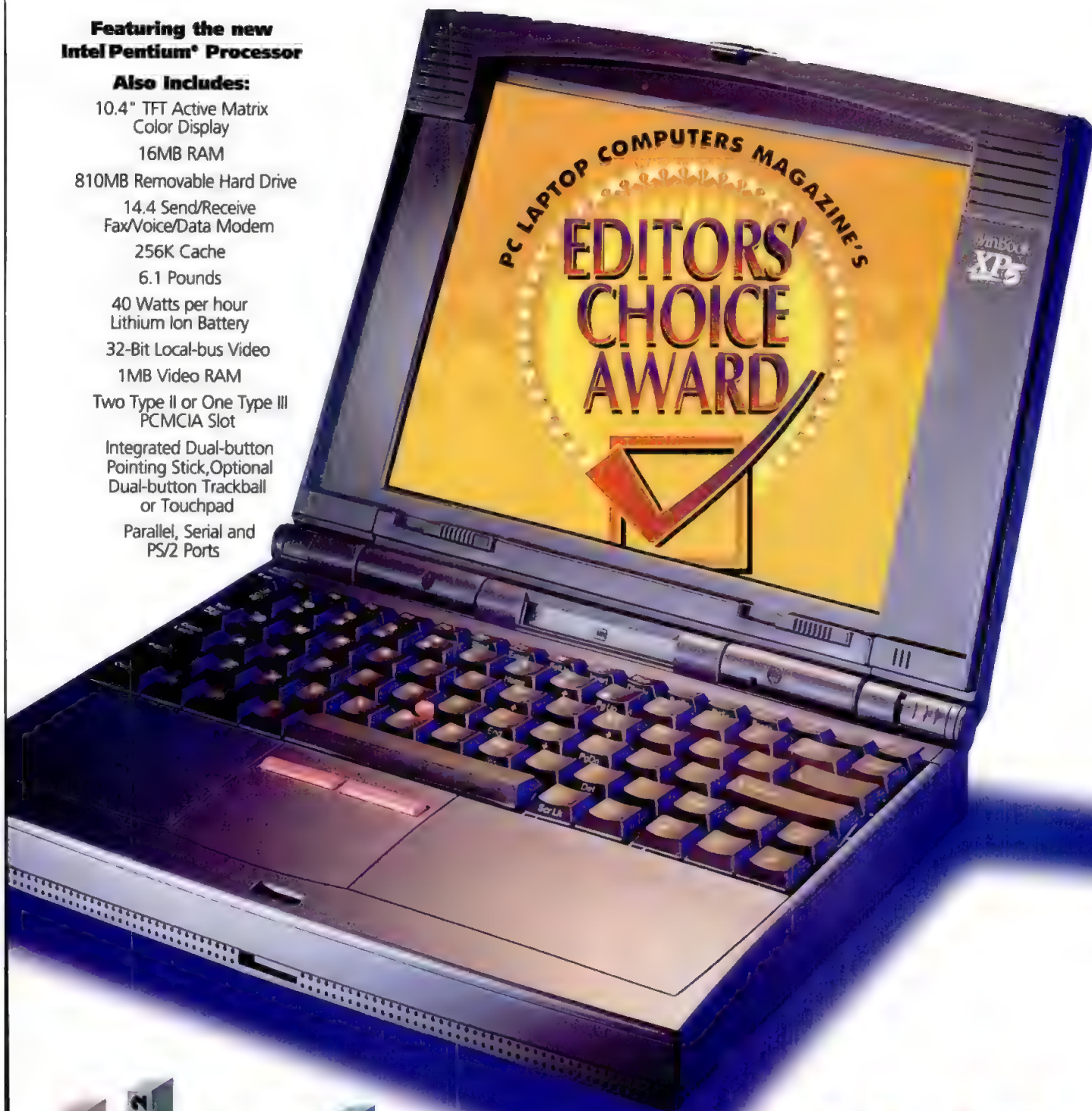
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Battery Life vs. Portability

Nickel hydride is still the most widely used battery technology, but the margin has narrowed since our last notebook roundup. Here, 25 notebooks use nickel hydride packs, while 16 employ lithium ion. While lithium retains the performance edge, such cells are still in short supply, and they are more expensive than NiMH.

The \$4,678 lithium ion-powered Toshiba Portégé 610CT, one of our Editors' Choice recipients and the only subnotebook in the roundup, is this issue's leader on the battery-life-versus-portability scale. This unit ran for 2 hours 51 minutes on our WinDrain battery test and weighs in at a mere 5 pounds 8 ounces when outfitted for the road.

The cluster of next-best performers includes all three Dell entries and the WinBook XP5. All four came equipped with lithium ion battery packs like the Portégé. The \$3,899 Dell Latitude XPi

P75T and the \$4,399 XPi P90T, both with travel weights of about 7 pounds, ran for 2 hours 35 minutes each. The \$5,099 Dell Latitude XPi P120ST ran for 2 hours 22 minutes, using the same battery as its siblings. The 7-pound WinBook XP5 posted a 2-hour-15-minute time on our WinDrain tests.

The top-performing notebook using nickel hydride batteries was the \$2,999 ACW SoundPad IIIB P5-133 DS, which lasted nearly 3 hours. The trade-off here, however, is in travel weight: This machine was among the heaviest in the roundup because it uses a second, external battery that screws onto the back of the case, adding over a pound to its heft and making its travel weight 9.3 pounds (sans an external floppy disk drive).

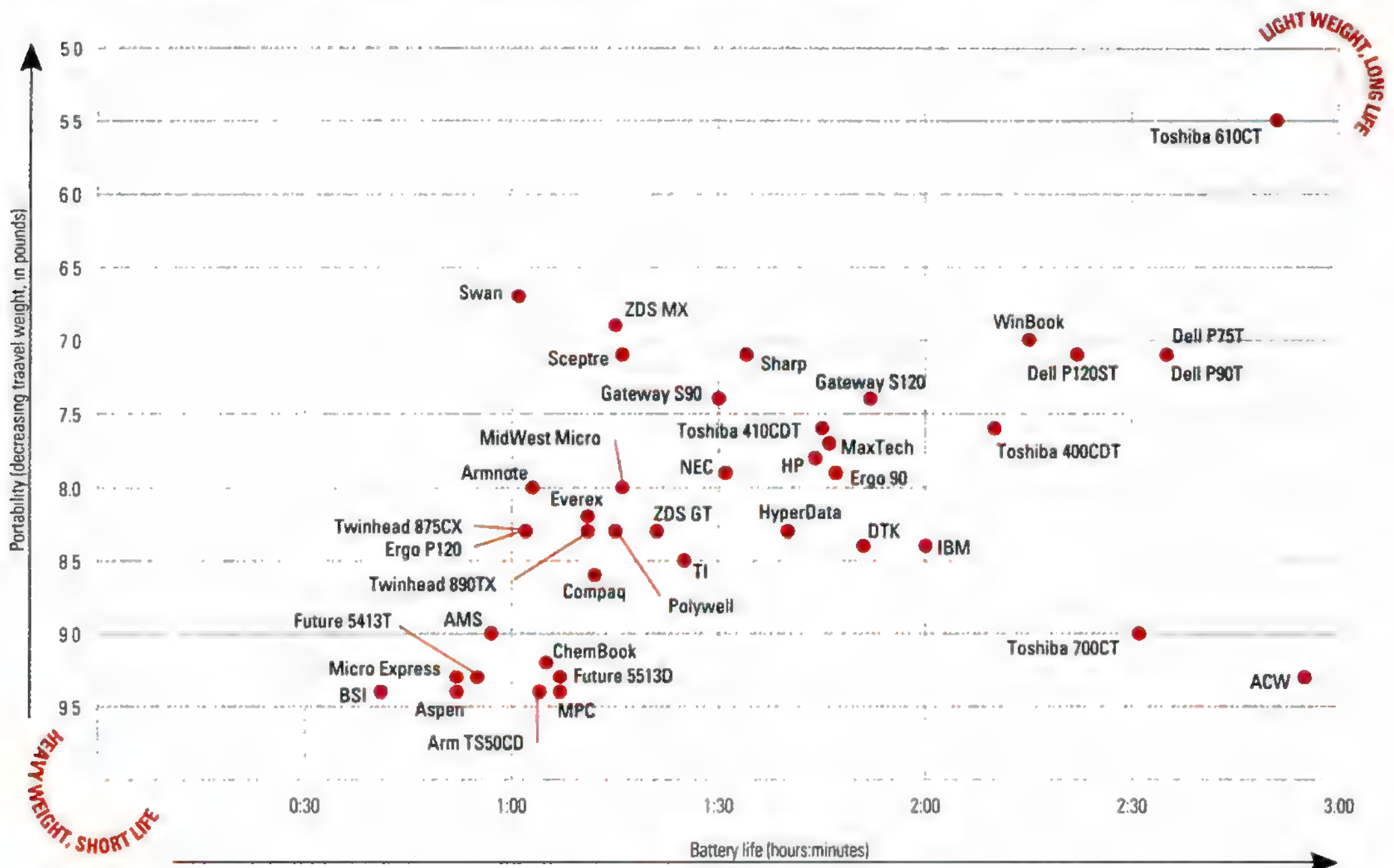
Other lithium ion-powered entries that posted WinDrain times of 2 hours or better include two of our Editors' Choice winners—the \$4,678 Toshiba

Satellite Pro 400CDT and the \$7,924 IBM ThinkPad 760CD—as well as the \$5,999 Toshiba Tecra 700CT. Surprisingly, none of these machines skimp on components in order to save battery power.

The ThinkPad 760CD ran for 2 hours, an impressive feat considering that the system was supporting not only a 90-MHz Pentium processor, but a 12.2-inch active-matrix SVGA display, a quad-speed CD-ROM drive, and a 1.1GB hard disk as well. The system's travel weight tips the scales at 8.4 pounds.

The Toshiba Satellite Pro 400CDT garnered a score of 2 hours 10 minutes on our WinDrain test. This machine is driven by a 75-MHz Pentium CPU and also features a 10.4-inch active-matrix display, a quad-speed CD-ROM drive, and a relatively light-for-its-class 7.6-pound travel weight.

Toshiba's flagship portable, the Tecra 700CT, lasted for 2 hours 31



Battery Life vs. Portability

	Travel weight (pounds)	Battery weight (pounds)	Battery life (hours: minutes)	Battery life per pound of battery weight (hours: minutes)
ACW SoundPad IIIB P5-133 DS	9.3	2.7*	2:55	1:05
AMS PowerCD	9.0	1.0	0:57	0:57
Armnote TS30PH	8.0	1.3	1:03	0:48
Arm TS50CD	9.4	1.1	1:04	1:00
Aspen Universa P-CD	9.4	1.1	0:52	0:48
BSI NP5262T	9.4	1.1	0:41	2:42
ChemBook 5550	9.2	1.1	1:05	1:00
Compaq LTE 5100	8.6	1.3	1:12	0:54
Dell Latitude XPi P75T	7.1	0.9	2:35	3:00
Dell Latitude XPi P90T	7.1	0.9	2:35	3:00
Dell Latitude XPi P120ST	7.1	0.9	2:22	2:48
DTK DTN-5P90	8.4	1.5	1:51	1:12
Ergo PowerBrick 90	7.9	1.4	1:47	1:18
Ergo CD-NoteBrick P120	8.3	1.2	1:02	0:54
Everex Express Note P90	8.2	1.3	1:11	0:54
FutureTech FutureMate 5513D	9.3	1.1	1:07	1:00
FutureTech FutureMate 5413T	9.3	1.1	0:55	0:54
Gateway Solo S90	7.4	0.9	1:30	1:42
Gateway Solo S120	7.4	0.9	1:52	2:06
HP OmniBook 5000 CTS	7.8	0.9	1:44	1:54
HyperData Media Go CD-Note	8.3	1.2	1:40	1:24
IBM ThinkPad 760CD	8.4	0.8	2:00	2:18
MaxTech X-751C Yesbook	7.7	1.3	1:46	1:24
Micro Express NP52P100	9.3	1.1	0:52	0:47
MidWest Micro Sound Book Plus P5-90	8.0	1.3	1:16	1:00
MPC CD-Note 900P	9.4	1.1	1:07	1:00
NEC Versa 4050C	7.9	0.6	1:31	2:24
Polywell Poly 500NBS	8.3	1.5	1:15	0:54
Sceptre SoundX Gold Series	7.1	0.9	1:16	1:24
Sharp PC-3060	7.1	1.1	1:34	1:24
SwanNotePlus P75	6.7	0.9	1:01	1:12
TI Extensa 550CDT	8.5	1.3	1:25	1:06
Toshiba Portégé 610CT	5.5	1.0	2:51	2:51
Toshiba Satellite Pro 400CDT	7.6	0.8	2:10	2:36
Toshiba Satellite Pro 410CDT	7.6	0.8	1:45	2:06
Toshiba Tecra 700CT	9.0	1.3	2:31	2:00
Twinhead Slimnote 875CX	8.3	0.7	1:02	1:24
Twinhead Slimnote 890TX	8.3	0.7	1:11	1:36
WinBook XP5	7.0	0.9	2:15	2:24
ZDS Z-Note GT	8.3	0.9	1:21	1:24
ZDS Z-Note MX	6.9	0.9	1:15	1:18

* Internal and external batteries combined.

minutes on our WinDrain test. A lot of components are included in the 9-pound (travel weight) Tecra 700CT: a Pentium/120 CPU, an 11.3-inch SVGA display, a quad-speed CD-ROM drive, a 1.1GB hard disk, and 16MB of cutting-edge synchronous DRAM (the only portable in this roundup to use it).

On the opposite end of the battery-life scale fell the \$4,005 BSI NP5262T. Weighing in at a relatively hefty 9.4 pounds, the BSI NP5262T lasted only

41 minutes on our WinDrain test. You can purchase a second battery (\$115) for this unit, which will boost battery life.

Included in our definition of travel weight are the base unit, battery, AC adapter, and cord. We do not include the weight of the external floppy disk drive, if the unit has one. For systems with interchangeable CD-ROM and floppy disk drives, we include only the weight of the CD-ROM drive.

—Analysis written by Mary E. Behr

hydride battery (a \$145 option). The second battery fits into the slot created by removing the floppy disk drive.

The AMS PowerCD includes a three-year parts-and-labor warranty. On-site service is not available.—WPF

AMS PowerCD. List price: \$4,125. AMS Inc., Irwindale, CA; 800-886-2671, 818-814-8851; fax, 818-814-0782.

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ARM Computer Inc.

Armnote TS30PH, Arm TS50CD

ARM Computer does not specify any particular market for either the \$3,599 90-MHz Armnote TS30PH or the \$4,299 Arm TS50CD (street prices). The 120-MHz TS50CD is manufactured by Dual Technologies and is also sold by CHEM USA Corp. as the ChemBook 5550, by FutureTech Systems as the FutureMate 5513D, and by MPC Technologies as the CD-Note 900P (all units reviewed in this issue).

The TS30PH has a travel weight of 8 pounds, while the TS50CD tips the scales with a travel weight of 9.4 pounds. Using nickel hydride battery packs, both notebooks posted times of just over an hour on our WinDrain battery test.

The TS30PH features a 10.4-inch active-matrix color display and 16-bit sound. This Pentium/90 with 256K of

SUITABILITY TO TASK

Armnote TS30PH

Desktop replacement	Good
Road warrior	Good

SUITABILITY TO TASK

Arm TS50CD

Desktop replacement	Good
Road warrior	Fair

pipelined-burst L2 cache had a below-average Graphics WinMark 96 score, and its Disk WinMark 96 and Winstone 96 scores were among the lowest in its CPU group.

The TS50CD has a number of modular components, including a 1.3GB hard disk and a CD-ROM drive. The CD-ROM and floppy disk drives share the same spot. The 11.3-inch Super VGA dual-scan display can be turned around for presentation purposes. The unit's Disk WinMark score was slightly below average, but its Graphics WinMark and Winstone scores were average for a 120-MHz Pentium portable.

ARM Computer backs the two note-



Armnote TS30PH.

books with a one-year-parts, three-years-labor warranty, which includes one year of on-site service.—WPF

Armnote TS30PH. Estimated street price: \$3,599. **Arm TS50CD.** Street price: \$4,299. ARM Computer Inc., San Jose, CA; 800-765-1767, 408-428-9800; fax, 408-428-9528. Circle 454 on reader service card

Aspen Computer Inc.

Aspen Universa P-CD

The Pentium/120-powered Aspen Universa P-CD (\$3,875 street) is an all-in-one solution, featuring a 1.3GB hard disk, a removable 3.5-inch floppy disk drive, and a removable TEAC double-speed CD-ROM drive. All three components have their own bays, so there is nothing to switch out, lose, or leave behind. You pay a price in travel weight, however: The unit tips the scales at a full 9.4 pounds. The Universa P-CD is aimed at marketing executives, software developers, and multimedia users.

The Universa P-CD offers another unusual feature: a joystick embedded in the wrist rest that flanks the touch pad. On the left is the joystick wheel, and on the right are four function keys. The unit also includes one Type III or two Type II PC Card slots, a

SUITABILITY TO TASK

Aspen Universa P-CD

Desktop replacement	Good
Road warrior	Fair



Aspen Universa P-CD.

MIDI port, and an infrared port.

The back of the notebook is home to all standard ports as well as a proprietary port for the optional external battery (\$185). The unit's nickel hydride battery lasted only 0:52 on our WinDrain battery test. A second internal battery, which fits in the floppy disk drive bay, is \$95.

With 256K L2 cache, the Universa P-CD posted average scores on our Winstone 96 and Disk WinMark 96 tests. Its Graphics WinMark 96 score was below average. On subjective and objective video tests, frame dropping was evident.

Aspen Computer provides a one-year-parts, two-years-labor warranty. On-site service is not included.—Mary E. Behr

Aspen Universa P-CD. Estimated street price: \$3,875. Aspen Computer Inc., Buffalo, NY; 800-472-3273, 716-626-0315; fax, 716-626-1541; Web, www.visdesigns.com/aspen/. Circle 455 on reader service card

Broadax Systems Inc.

BSI NP5262T

The BSI NP5262T, from Broadax Systems, has one of this roundup's most popular case designs: It includes an embedded joystick, GlidePoint touch pad, and dedicated space for just about every kind of drive you could want. This Pentium/120 notebook (\$4,005 street) is aimed at students and home and business users.

The BSI NP5262T weighs 9.4 pounds when equipped for the road. There is an optional 2.8-pound battery that screws onto the back of the machine (\$115; not included in the price above). On our WinDrain battery test, we ran the unit with only the standard nickel hydride battery. It lasted just 0:41, which suggests that the optional battery is well worth the price.

The unit's 10.4-inch active-matrix screen was sharp. The system also features a removable 1.3GB hard disk and floppy disk drives. The TEAC double-speed CD-ROM, however, is not removable.

The BSI NP5262T features 256K of asynchronous L2 cache. The unit posted average Disk WinMark 96 and Winstone 96 scores for its class. The Cirrus Logic

SUITABILITY TO TASK

BSI NP5262T

Desktop replacement	Good
Road warrior	Good

graphics chip set with 2MB of DRAM helped achieve an average Graphics WinMark 96 score. The BSI NP5262T's CD-ROM WinMark 96 and video test scores were average, although there was noticeable frame dropping on subjective tests.

A mini docking station for the BSI NP5262T is \$195. Broadax includes a one-year parts-and-labor warranty. No on-site service is available.—MEB

BSI NP5262T. Estimated street price: \$4,005.



BSI NP5262T.

Broadax Systems Inc., El Monte, CA; 800-872-4547, 818-442-0020; fax, 818-442-4527; e-mail, bsi@earthlink.net.

Circle 456 on reader service card

CHEM USA Corp.

ChemBook 5550

The modular ChemBook 5550, from CHEM USA Corp., offers interesting multimedia features and average performance for a 120-MHz Pentium notebook. The ChemBook 5550 (\$3,965 street) is aimed at buyers who want a user-upgradable Pentium notebook. This unit, manufactured by Dual Technology Corp., is also sold by ARM (as the Arm TS50CD), FutureTech Systems (as the FutureMate 5513D), and MPC (as the CD-Note 900P). All are reviewed in this issue.

The unit has a 10.1-inch active-matrix screen that can be reversed as well as a removable 772MB hard disk, 256K of asynchronous L2 cache, and a pointing stick. The double-speed TEAC CD-ROM drive can be swapped for another battery, as can the unit's floppy disk drive.

The ChemBook 5550 can accommodate a Type III and a Type II PC Card at the same time, and it came with an ESS

SUITABILITY TO TASK

ChemBook 5550

Desktop replacement	Good
Road warrior	Fair

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PC Magazine, April 25, 1995

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- Microsoft Windows 95 CD

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May 16, 1995
P90 HOME MPC



July 1995
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- PCI 64-bit video, MPEG, 2MB EDO
- 17" Micron 17FGx, 1280NI, .26mm monitor
- Tool-free mini-tower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs
- *Microsoft Scenes: Sports Extremes; Microsoft Bob™ CD; Microsoft Encarta™ 95 CD; Quicken® Deluxe Edition CD; Microsoft Dangerous Creatures CD; Microsoft Golf Multimedia CD; Trial subscriptions for Compuserve™, Prodigy™ and America On-Line™.*

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ChemBook 5550.

sound card, which offers 16-bit FM-synthesis audio. The unit's two speakers are on the bottom, where the sound is easily muffled.

The ChemBook 5550's Winstone 96 and Disk WinMark 96 scores were average, while its Graphics WinMark 96 score was above average. Video performance was acceptable. The nickel hydride battery lasted 1:05, and the unit's travel weight was a very hefty 9.2 pounds.

The unit has a one-year warranty. On-site service is not available.—RSA

ChemBook 5550. Estimated street price: \$3,965. CHEM USA Corp., Hayward, CA; 800-866-2436, 510-785-8080; fax, 510-785-1010; e-mail, chemusa@ix.net-com.com.

Circle 457 on reader service card

Compaq Computer Corp.

Compaq LTE 5100

Touting modularity and multimedia components, Compaq Computer Corp.'s Compaq LTE 5100 is intended for companies with different user needs, where MIS managers prefer to maintain a single, adaptable notebook. Our tested configuration was the Model 810-CD (\$6,428 street), which has a long list of solid components: an internal double-speed TEAC CD-ROM drive, a 10.5-inch active-matrix color display capable of 800-by-600

SUITABILITY TO TASK

Compaq LTE 5100

Desktop replacement	Good
Road warrior	Good

SERVICE & RELIABILITY

Compaq Computer Corp.

Reliability	Better than average
Repair	Better than average
Technical support	Better than average
% needing repair	Better than average

resolution, a 772MB hard disk, and a 90-MHz Pentium processor with 256K of external processor cache.

The LTE 5100 was a solid performer within its processor class, earning consistently average scores on all tests. During video clip testing, however, the unit dropped many frames on the Full-Screen Scaling test. The system's battery life with a nickel hydride battery was only 1:12 on our WinDrain test. A lithium ion battery is currently available for \$229 (this battery was not available at the time of our testing).

The LTE 5100's case is slightly larger than the average portable, and its travel weight is 8.6 pounds. If you carry the floppy disk drive module, add another 0.6 pounds. Since they are modular, it's



Compaq LTE 5100.

easy to switch the floppy disk and CD-ROM drives in this notebook system. The optional docking station—the MultiBay Expansion Base (\$499, available now)—includes a MIDI game port, two Type III PC Card slots, and two device bays.

For multimedia applications, the LTE 5100 has an audio system with FM-synthesis sound and stereo speakers on either side of the display panel. Compaq also offers an optional \$599 MPEG and TV adapter with the unit, but it was not available in time for testing.

Compaq includes a three-year parts-and-labor warranty with this notebook system and provides 24-hour, 7-day toll-free telephone technical support. On-site service for the unit costs \$149 per year.—BB

Compaq LTE 5100. Estimated street price: \$6,428. Compaq Computer Corp., Houston, TX; 800-345-1518; fax, 713-518-1442; Web, <http://www.compaq.com>.

Circle 458 on reader service card

Dell Computer Corp.

Latitude XPI P75T, Latitude XPI P90T, Latitude XPI P120ST

Dell Computer Corp.'s Latitude XPI line is targeted at businesses and professionals who want no-compromise-performance portables and easy LAN hookups. The three active-matrix models—the \$3,899 75-MHz Pentium Latitude XPI P75T, the \$4,399 90-MHz Latitude XPI P90T, and the 120-MHz \$5,099 Latitude XPI P120ST—become network-ready when you use them with the optional \$199 port replicator with an Ethernet interface and desktop docking platform. (The cited prices are all street prices.)

Each Latitude XPI unit weighs 7.1 pounds (travel weight); the optional port replicator, which provides all standard ports and includes an Ethernet and a SCSI-2 connector, adds 1.3 pounds. When you return to the office, any of the notebooks (with replicator attached) will slide into the docking platform, which has a monitor stand and cutouts for a security cable.

All three models have 256K synchronous external processor cache and 10.4-inch active-matrix screens. The P75T and P90T displays have a maximum 640-by-480

SUITABILITY TO TASK

Dell Latitude XPI P120T

Desktop replacement	Fair
Road warrior	Excellent

SUITABILITY TO TASK

Dell Latitude XPI P90T

Desktop replacement	Fair
Road warrior	Excellent

SUITABILITY TO TASK

Dell Latitude XPI P75T

Desktop replacement	Fair
Road warrior	Good



Latitude XPI P120ST.

THE TI EXTENSA 550CD. AT THIS MULTIMEDIA POWERHOUSE

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EXTENSA 550CD

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- 10.4" Active Matrix (TFT)
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Thanks to the new TI Extensa™ 550CD, now you can't afford not to take Pentium® multimedia on the road.

At its low price, you might find other portable multimedia machines, but they probably won't have Pentium processors, and if they do, they're not likely to have a built-in CD-ROM. But that's just part of the TI Extensa 550CD's superiority. For better high-speed video and optimal performance for CD-ROM applications, the TI Extensa 550CD uses the same circuitry (called Peripheral Component Interconnect or PCI) used in most desktop computers.

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There is also the extra convenience and versatility of the removable CD-ROM drive which allows you to use an internal floppy drive, or even to support a lithium ion battery for longer performance. And with a serial infrared port, the TI Extensa 550CD can print or share files, wirelessly.

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Internet: <http://www.ti.com>

 **TEXAS
INSTRUMENTS**

Color Pentium Notebooks

resolution, while the P120ST can run in 800-by-600 Super VGA mode. Hard disk sizes run from 500MB in the P75T to 773MB in the P90T and 1.2GB in the P120ST. A new model, the P90ST, announced after our testing was completed, will sell for \$4,599 and support SVGA.

SERVICE & RELIABILITY

Dell Computer Corp.

Reliability	Average
-------------	---------

Repair	Average
--------	---------

Technical support	Average
-------------------	---------

% needing repair	Average
------------------	---------

On our benchmark tests, the Latitude XPi P75T managed an average Graphics WinMark 96 score but had the lowest Disk WinMark 96 and Winstone 96 scores of the tested 75-MHz systems. The Latitude XPi P90T and P120ST had average scores on all tests within their respective CPU classes, with the exception of a below-average Graphics WinMark score for the P90T. The units' lithium ion batteries did well on our WinDrain test: The battery lasted 2:35 in the 75-MHz and 90-MHz notebook units, and 2:22 in the 120-MHz system.

The three Dell Latitude XPi notebooks come with a three-year-parts and one-year-labor warranty. This warranty includes free next-business-day, on-site service for the first year and 24-hour, 7-day technical support.—BB

Latitude XPi P75T. Estimated street price: \$3,899. **Latitude XPi P90T.** Street price: \$4,399. **Latitude XPi P120ST.** Street price: \$5,099. Dell Computer Corp., Austin, TX; 800-348-6151, 512-338-4400; fax, 800-727-8320; Web, <http://www.us.dell.com>.

Circle 459 on reader service card

DTK Computer Inc.

DTK DTN-5P90

DTK Computer's \$3,590 (street price) DTK DTN-5P90 is a good choice for the vendor's target market of mainstream corporate users. An average performer, the 90-MHz Pentium system comes with 256K L2 cache, a 10-inch active-matrix display, a 772MB hard disk, and a 14.4-Kbps PC Card modem.

The DTN-5P90's benchmark test scores were all average for its class. The 1:51 WinDrain test time was among the five best scores for notebooks with nickel hydride batteries.

SUITABILITY TO TASK

DTK DTN-5P90

Desktop replacement	Good
Road warrior	Poor



DTK DTN-5P90.

books with nickel hydride batteries.

The notebook, larger-than-usual AC adapter, and modem total 8.4 pounds (travel weight). The DTN-5P90 has a trackball integrated into the wrist rest and foldout feet so you can tilt the keyboard to a comfortable angle. The system's 16-bit FM and wavetable audio setup includes stereo speakers, microphone-in and speaker-out jacks, and a volume dial.

An optional \$460 docking station adds four ISA and two VL Bus slots, a fast SCSI-2 controller with one external and two internal ports, 4-watt speakers, two drive bays, and duplicate I/O ports. While the docking station is too big and heavy for portable applications, installing a CD-ROM drive would make the DTK system suitable for stationary multimedia jobs.

The software bundled with the portable includes Delrina's WinFax Lite and WinComm LITE. DTK Computer includes a one-year parts-and-labor warranty but no on-site service. Technical support is available during weekday business hours.—BB

DTK DTN-5P90. Estimated street price: \$3,590. DTK Computer Inc., City of Industry, CA; 800-289-2385, 818-810-0098; fax, 818-810-0090.

Circle 460 on reader service card

Ergo Computing Inc.

PowerBrick 90,
CD-NoteBrick P120

Ergo Computing aims for two distinct types of users with its entries: The PowerBrick 90 (\$3,795 street) is for traditional business travelers, and the \$3,895 CD-NoteBrick P120 is for power users who need multimedia extras.

The Pentium/90-based PowerBrick 90 offers a 10-inch active-matrix screen, a 517MB hard disk, and a built-in 14.4-Kbps

fax modem. The system's \$259 docking station offers two ISA slots, two serial ports, a parallel port, and a VGA port.

The CD-NoteBrick P120 features a double-speed CD-ROM drive under a flip-up keyboard, a SCSI-2 port, a MIDI/game port, and an NTSC video-out port. The system uses a 10.4-inch dual-scan LCD panel, a 670MB hard disk, and an external floppy disk drive. Both units have 256K of L2 cache and FM synthesis audio subsystems.

On our benchmark tests, the PowerBrick 90 had an above-average Winstone 96 score and average Disk WinMark 96 and Graphics WinMark 96 scores. Its nickel hydride battery lasted 1:47 on our WinDrain test, and its travel weight is 7.9 pounds.

The Pentium/120-based CD-NoteBrick P120, however, posted an abysmal Winstone score, lower than those of the Pentium/75 entries. This low score was due to a



CD-NoteBrick P120.

problem in the unit's BIOS, which caused it to ignore its L2 cache, and which Ergo will have corrected by the time you read this. Its Disk WinMark, Graphics WinMark, and CD-ROM WinMark 96 scores were also below average. The unit's nickel hydride battery lasted just 1:02, and its travel weight was 8.3 pounds with the modem.

Ergo Computing provides a four-year parts-and-labor warranty, which includes a year of return-to-depot service.—RSA

PowerBrick 90. Estimated street price: \$3,795. **CD-NoteBrick P120.** Street price: \$3,895. Ergo Computing Inc., Peabody, MA; 800-633-1925, 508-535-7510; fax, 508-535-7512; CompuServe, GO ERGO.

Circle 461 on reader service card

SUITABILITY TO TASK

PowerBrick 90

Desktop replacement	Good
Road warrior	Good

SUITABILITY TO TASK

CD-NoteBrick P120

Desktop replacement	Good
Road warrior	Good

CorelFLOW 3 BEATS VISIO 4!

FEATURE	CorelFLOW 3	Visio 4
Symbols	6,400+	1,000+
Smart Symbol Libraries/Stencils	205	29
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Photos	1,000	0
Live repeating line patterns	YES	NO
Polygon tool	YES	NO
Fountain fills	YES	NO
Center and repeating arrows	YES	NO
Hyperlinks	YES	NO
Dynamic print preview	YES	NO
Multiple shadows	YES	NO
Thesaurus and Type Assist	YES	NO
Live auto-line routing	YES	NO
Script editor	YES	NO
Number of color models supported	8	2

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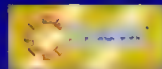
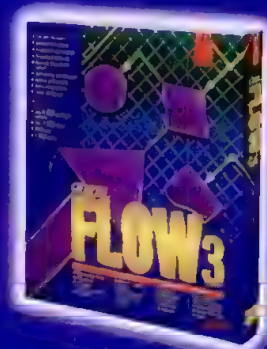
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Everex Systems Inc.

Express Note P90

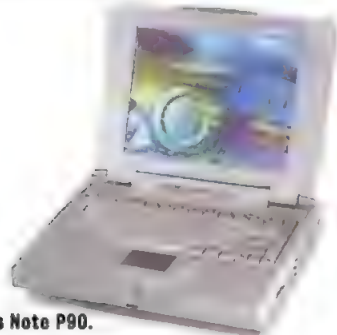
The modular \$4,295 (street price) Express Note P90, from Everex Systems, offers a number of useful multimedia features for the demanding power user, but its performance didn't always keep in step with its class of 90-MHz Pentium notebooks. Everex aims the unit—which has a travel weight of 8.2 pounds—at the traveler who needs the option of CD-ROM and audio support for multimedia software.

The Express Note P90 uses an Alps touch pad. The unit came with a 10.4-inch active-matrix display, a 777MB hard disk, a removable TEAC double-speed CD-ROM drive, and 256K of synchronous L2 cache. It had other appealing features such as an IrDA-compatible infrared port, a stereo speaker on either side of the display, and an FM-synthesis audio subsystem. The Express Note P90 can also accommodate one Type III or two Type II PC cards.

The CD-ROM drive module can be swapped for a second battery or a floppy disk drive, even though the CD-ROM drive is much wider than the other modules. A tiny door in the unit glides forward and swivels up to fill in the gap.

The Express Note P90 posted average scores for its 90-MHz Pentium class on all Windows-based benchmark tests. With one nickel hydride battery installed, the unit lasted just 1:11 on our WinDrain battery test. Lithium ion batteries will be available for this portable in the second quarter of 1996.

Everex Systems offers a three-year parts-and-labor warranty with this unit. On-site service is not available.—RSA



Express Note P90.

Express Note P90. Estimated street price: \$4,295. Everex Systems Inc., Fremont, CA; 800-383-7391, 510-498-1111; fax, 510-683-2240; Web, <http://www.everex.com>.

Circle 462 on reader service card

FutureTech Systems Inc.

FutureMate 5513D, FutureMate 5413T

FutureTech Systems sells two CD-ROM-equipped, 133-MHz Pentium notebooks. The \$3,495 FutureMate 5513D with a removable color screen is a good buy for traveling presenters. The \$3,729 FutureMate 5413T is a solid performer aimed at power users and is equipped with a fast PCI bus and 2MB video VRAM. (Street prices are cited).

The FutureMate 5513D is manufactured by Dual Technology Corp. It is also sold by ARM (as the Arm TS50CD), CHEM (as the ChemBook 5550), and MPC (as the CD-Note 900P). (All are reviewed in this issue.)

The highly modular 5513D multimedia machine's travel weight is 9.3 pounds. You can remove the 776MB hard disk, double-speed CD-ROM drive, floppy disk drive, and 11.3-inch dual-scan display.

The 5513D had a below-average Disk WinMark 96 score, an above-average Graphics WinMark 96 score, and an average Winstone 96 score. On subjective and objective video testing, the system showed dropped frames. If you use full-motion video in your presentations, consider the \$465 video tuner option. Tested nickel hydride battery life was only 1:07.

The 5413T weighs 9.3 pounds (travel weight) and features a 10.5-inch active-matrix screen, an infrared port, and a MIDI/game port. The unit had above-average Winstone and Disk WinMark scores and average Graphics WinMark and CD-ROM WinMark scores. The 5413T showed more frame dropping on subjective and Labs-based tests than the 5513D did. The 5413T's nickel hydride battery lasted only 55 minutes during testing (a clip-on battery is available for \$225).



FutureMate 5513D.

Both FutureTech models have one-year parts-and-labor warranties but no on-site service.—BB

FutureMate 5513D. Estimated street price: \$3,495. **FutureMate 5413T.** Street price: \$3,729. FutureTech Systems Inc., Hackensack, NJ; 800-275-4414, 201-488-4414; fax, 201-488-4405; e-mail, futuretk@ios.com.

Circle 463 on reader service card

Gateway 2000 Inc.

Gateway Solo S90, Gateway Solo S120

The Gateway Solo portables combine solid performance with high-end features and components. The \$5,999 (street) Pentium/120 Gateway Solo S120 is targeted toward the road warrior, and the \$5,799 Pentium/90 Gateway Solo S90 is for the power user who wants a desktop replacement unit. Identical except for the price and the processor, these systems would please either target group.

Each Solo has a 10.4-inch active-matrix SVGA display and a modular design with a removable 1.2GB hard disk and double-speed CD-ROM drive. With the CD-ROM drive, the travel weight is 7.4 pounds. The lithium ion batteries helped the Solo S120 post a 1:52 WinDrain time; the Solo S90 ran for 1:30.

The Solo notebooks include 256K of L2 cache and an IrDA-compliant infrared

SUITABILITY TO TASK

FutureMate 5413T

Desktop replacement	Fair
Road warrior	Fair

SUITABILITY TO TASK

FutureMate 5513D

Desktop replacement	Fair
Road warrior	Fair

SERVICE & RELIABILITY

Gateway 2000 Inc.

Reliability	Average
Repair	Average
Technical support	Better than average
% needing repair	Average

SUITABILITY TO TASK

Gateway Solo S90

Desktop replacement	Good
Road warrior	Good

SUITABILITY TO TASK

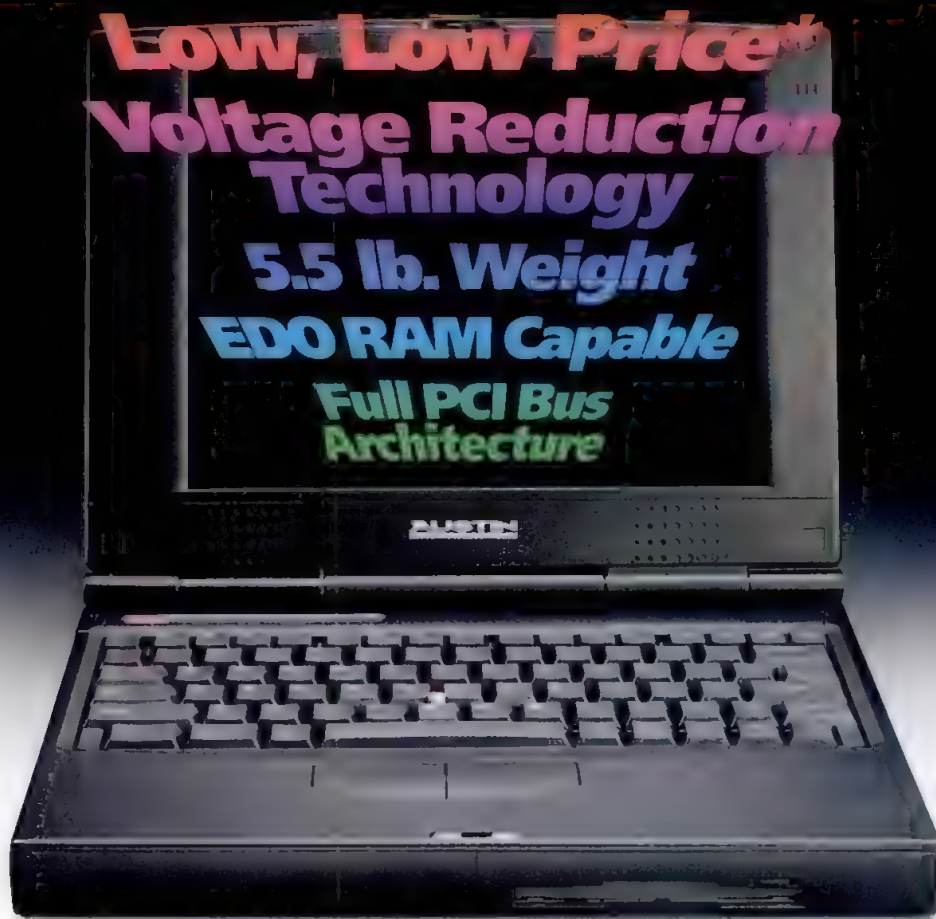
Gateway Solo S120

Desktop replacement	Good
Road warrior	Excellent

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Austin Edge XP-75

Intel Mobile Triton[™] PCI Bus
16-Bit Stereo Business Audio
Built-in Microphone and Speaker
External Jacks for Line-In/Line-Out
Integrated Pointing Stick Mouse
2 Type II or 1 Type III PCMCIA Slots
Parallel, Serial, Keyboard, IRDA, SVGA Ports
Lithium Ion Battery
Weight with Battery: 5.5 lbs.
One-Year Parts & Labor Warranty
Win '95 Plug n' Play BIOS
Windows 95 Pre-Installed

**AUSTIN EDGE XP
PENTIUM-75** **\$2,610**

- 75MHz Intel Pentium Processor
- 10.4" DSTN Color Display
- 8MB RAM (expandable to 24MB)
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- 32-Bit PCI Video - 1MB
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PC Magazine, Editor's Choice Awards, May 30, 1995 Issue



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Internal 3.5" Diskette Drive
Integrated Pointing Device
2 Type II or 1 Type III PCMCIA Slots
Parallel, Serial, Keyboard, SVGA Ports
Weight with Battery: 6.8 lbs.
One-Year Parts & Labor Warranty
Windows 95 Pre-Installed

**AUSTIN EDGE XL
486DX4-75 \$2,286**

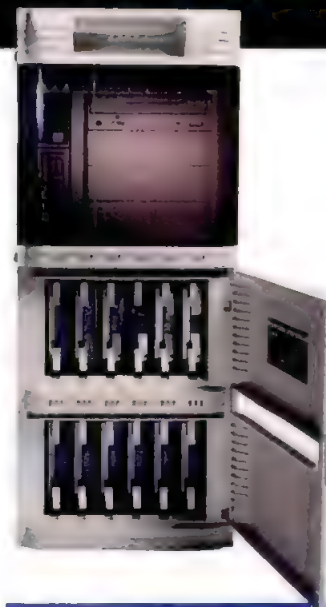
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PC Magazine, July 1995

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Benchmark Tests: Color Pentium Notebooks

With secondary processor cache, speedy hard disks, and even EDO RAM, notebooks are coming closer to desktop-level performance. Only graphics performance continues to lag behind.

What the Numbers Mean

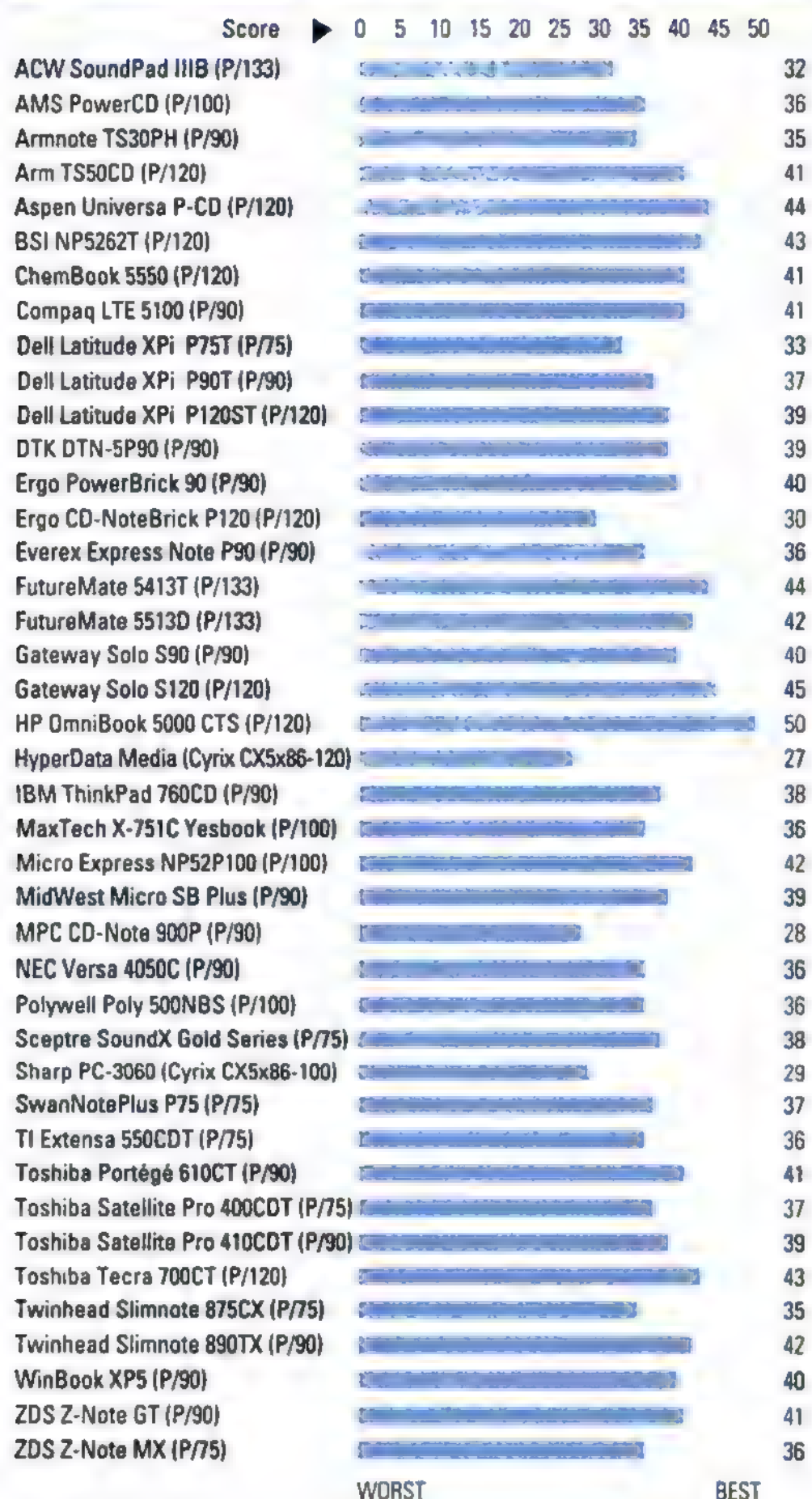
This roundup is marked by many firsts. We saw the first use of EDO DRAM in graphics subsystems. We saw the first Cyrix CX5x86-based notebooks. We saw the first quad-speed CD-ROM drives in portables. We got our first look at the OPTi Viper N chip set. And we saw the first use of synchronous DRAM (SDRAM) in main memory. With note-

books gaining on desktops in performance, this roundup also gave us an overwhelming majority of notebooks with L2 cache—certainly not the norm in the past.

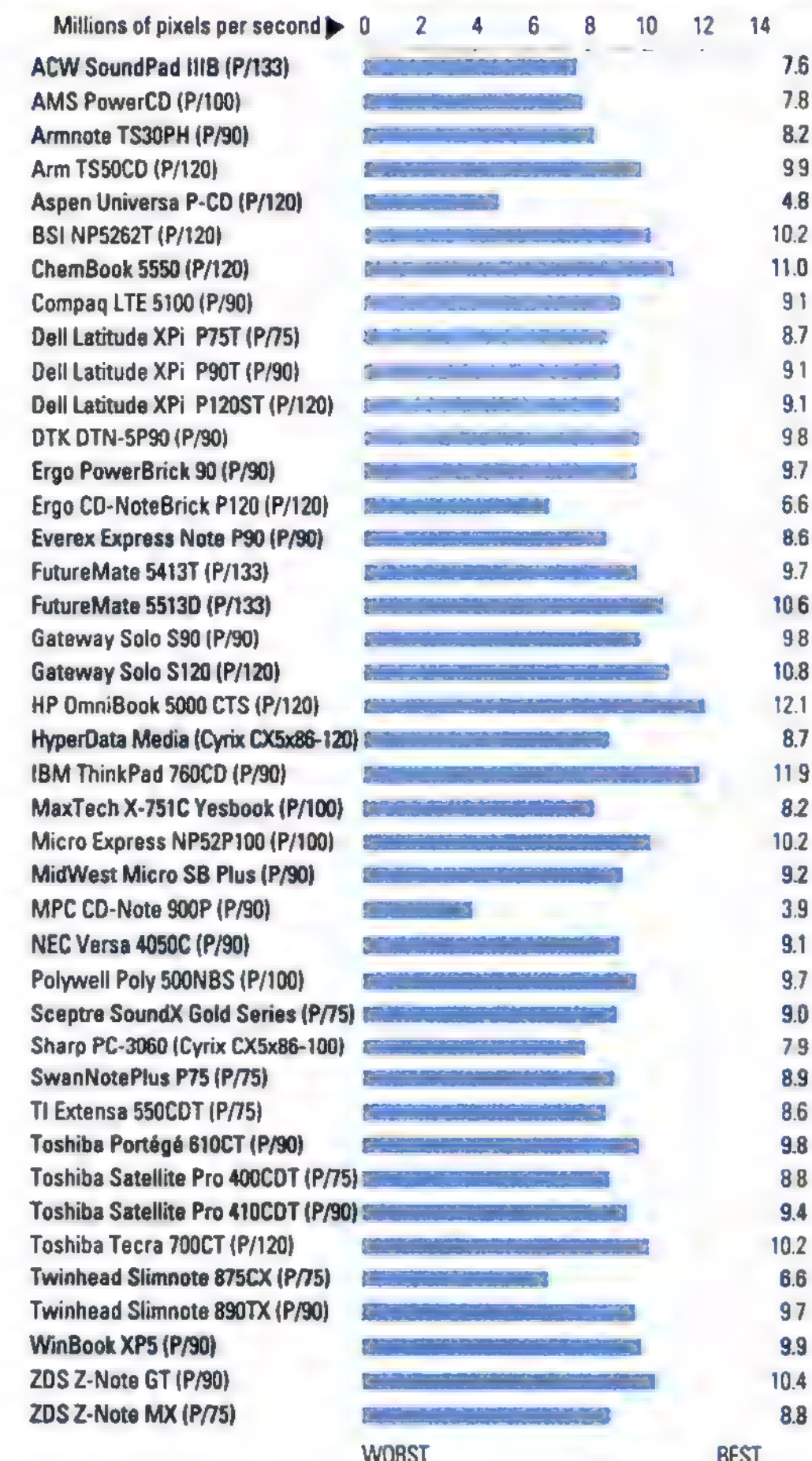
WINSTONE 96

Surprisingly, our top Winstone 96 performer was not one of the three Pentium/133 systems. On the average, the Pentium/120 systems outscored the Pentium/133s by about 2 percent, because Pentium/120 PC vendors in this roundup were better able to tune and optimize their systems. Hewlett-Packard's Pentium/120-powered OmniBook 5000 CTS turned in the best Winstone score. Combining 256K of pipelined-burst L2 cache, a fast-spinning (4,900-rpm) IBM hard disk, a Chips & Technologies 65545 graphics chip set, and also the new OPTi Viper 558N chip set gave the OmniBook the power it needed.

WINSTONE 96



GRAPHICS WINMARK 96



Our first look at Cyrix CX5x86-based portables resulted in low but not unexpected scores. HyperData Technology's Media Go CD-Note came with a 120-MHz Cyrix CX5x86 processor, and the Sharp PC-3060 used a 100-MHz Cyrix CX5x86 processor. With no L2 cache, both machines produced Winstone scores that were more than 30 percent lower than the average posted by the Pentium/75 group; HyperData's unit was actually slower than Sharp's. We believe that the HyperData system's cache and memory subsystems were partially responsible for this result.

GRAPHICS AND DISK WINMARK 96

With all 32-bit graphics engines, Windows graphics acceleration is the major obstacle that notebooks must overcome to reach desktop-level performance. Overall, systems with 32-

bit accelerators produce Graphics WinMark 96 scores that are about half of what desktops with 64-bit accelerators can achieve with the same processor.

In this notebook roundup, as in our previous one (August 1995), the Chips & Technologies 65545 graphics chip set was the overall performance leader on our Graphics WinMark tests. The C&T 65545 also supports both VL and PCI local buses. We saw both implementations in this review. But wherever both buses were used, the C&T 65545 VL-Bus implementation was the better performer.

For the first time we also saw graphics subsystems that used EDO DRAM—in the Arm TS50CD, the Everex Express Note P90, and the Toshiba Tecra 700CT. The Chips & Technologies 65545 and 65548 and the Cirrus Logic GD7543 chip set all can support EDO DRAM. Although EDO may give a slight per-

DISK WINMARK 96

Score	0	100	200	300	400	500	600	700	800	
ACW SoundPad IIIB (P/133)										414
AMS PowerCD (P/100)										505
Armnote TS30PH (P/90)										371
Arm TS50CD (P/120)										528
Aspen Universa P-CD (P/120)										576
BSI NP5262T (P/120)										586
ChemBook 5550 (P/120)										535
Compaq LTE 5100 (P/90)										583
Dell Latitude XPI P75T (P/75)										423
Dell Latitude XPI P90T (P/90)										531
Dell Latitude XPI P120ST (P/120)										611
DTK DTN-5P90 (P/90)										542
Ergo PowerBrick 90 (P/90)										552
Ergo CD-NoteBrick P120 (P/120)										500
Everex Express Note P90 (P/90)										531
FutureMate 5413T (P/133)										569
FutureMate 5513D (P/133)										408
Gateway Solo S90 (P/90)										583
Gateway Solo S120 (P/120)										618
HP OmniBook 5000 CTS (P/120)										717
HyperData Media (Cyrix CX5x86-120)										351
IBM ThinkPad 760CD (P/90)										628
MaxTech X-751C Yesbook (P/100)										512
Micro Express NP52P100 (P/100)										576
MidWest Micro SB Plus (P/90)										516
MPC CD-Note 900P (P/90)										479
NEC Versa 4050C (P/90)										511
Polywell Poly 500NBS (P/100)										542
Sceptre SoundX Gold Series (P/75)										523
Sharp PC-3060 (Cyrix CX5x86-100)										413
SwanNotePlus P75 (P/75)										513
TI Extensa 550CDT (P/75)										440
Toshiba Portégé 610CT (P/90)										603
Toshiba Satellite Pro 400CDT (P/75)										555
Toshiba Satellite Pro 410CDT (P/90)										534
Toshiba Tecra 700CT (P/120)										636
Twinhead Slimnote 875CX (P/75)										569
Twinhead Slimnote 890TX (P/90)										612
WinBook XP5 (P/90)										582
ZDS Z-Note GT (P/90)										559
ZDS Z-Note MX (P/75)										482
	WORST									BEST

CPUMARK16

Score	0	50	100	150	200	250	
ACW SoundPad IIIB (P/133)							142
AMS PowerCD (P/100)							143
Armnote TS30PH (P/90)							114
Arm TS50CD (P/120)							170
Aspen Universa P-CD (P/120)							186
BSI NP5262T (P/120)							179
ChemBook 5550 (P/120)							170
Compaq LTE 5100 (P/90)							175
Dell Latitude XPI P75T (P/75)							132
Dell Latitude XPI P90T (P/90)							141
Dell Latitude XPI P120ST (P/120)							183
DTK DTN-5P90 (P/90)							155
Ergo PowerBrick 90 (P/90)							159
Ergo CD-NoteBrick P120 (P/120)							112
Everex Express Note P90 (P/90)							135
FutureMate 5413T (P/133)							194
FutureMate 5513D (P/133)							183
Gateway Solo S90 (P/90)							167
Gateway Solo S120 (P/120)							198
HP OmniBook 5000 CTS (P/120)							223
HyperData Media (Cyrix CX5x86-120)							97
IBM ThinkPad 760CD (P/90)							143
MaxTech X-751C Yesbook (P/100)							143
Micro Express NP52P100 (P/100)							176
MidWest Micro SB Plus (P/90)							133
MPC CD-Note 900P (P/90)							123
NEC Versa 4050C (P/90)							143
Polywell Poly 500NBS (P/100)							164
Sceptre SoundX Gold Series (P/75)							142
Sharp PC-3060 (Cyrix CX5x86-100)							103
SwanNotePlus P75 (P/75)							142
TI Extensa 550CDT (P/75)							148
Toshiba Portégé 610CT (P/90)							164
Toshiba Satellite Pro 400CDT (P/75)							141
Toshiba Satellite Pro 410CDT (P/90)							164
Toshiba Tecra 700CT (P/120)							188
Twinhead Slimnote 875CX (P/75)							145
Twinhead Slimnote 890TX (P/90)							174
WinBook XP5 (P/90)							153
ZDS Z-Note GT (P/90)							161
ZDS Z-Note MX (P/75)							140
	WORST						BEST

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Benchmark Tests: Color Pentium Notebooks

formance boost, those notebooks using VRAM in many cases outperformed the systems using EDO DRAM.

All notebooks here used Enhanced IDE (or the similar specifications of ATA-2 and Fast ATA) hard disks. Those using hard disks with the fastest rotational speeds posted the highest scores on our Disk WinMark 96 tests. Hewlett-Packard's OmniBook 5000 CTS, using an IBM DPRA-21215 hard disk, turned in the highest Disk WinMark 96 score—717. This hard disk spins at 4,900 rpm, the fastest in this roundup.

CPUMARK₁₆ AND CPUMARK₃₂

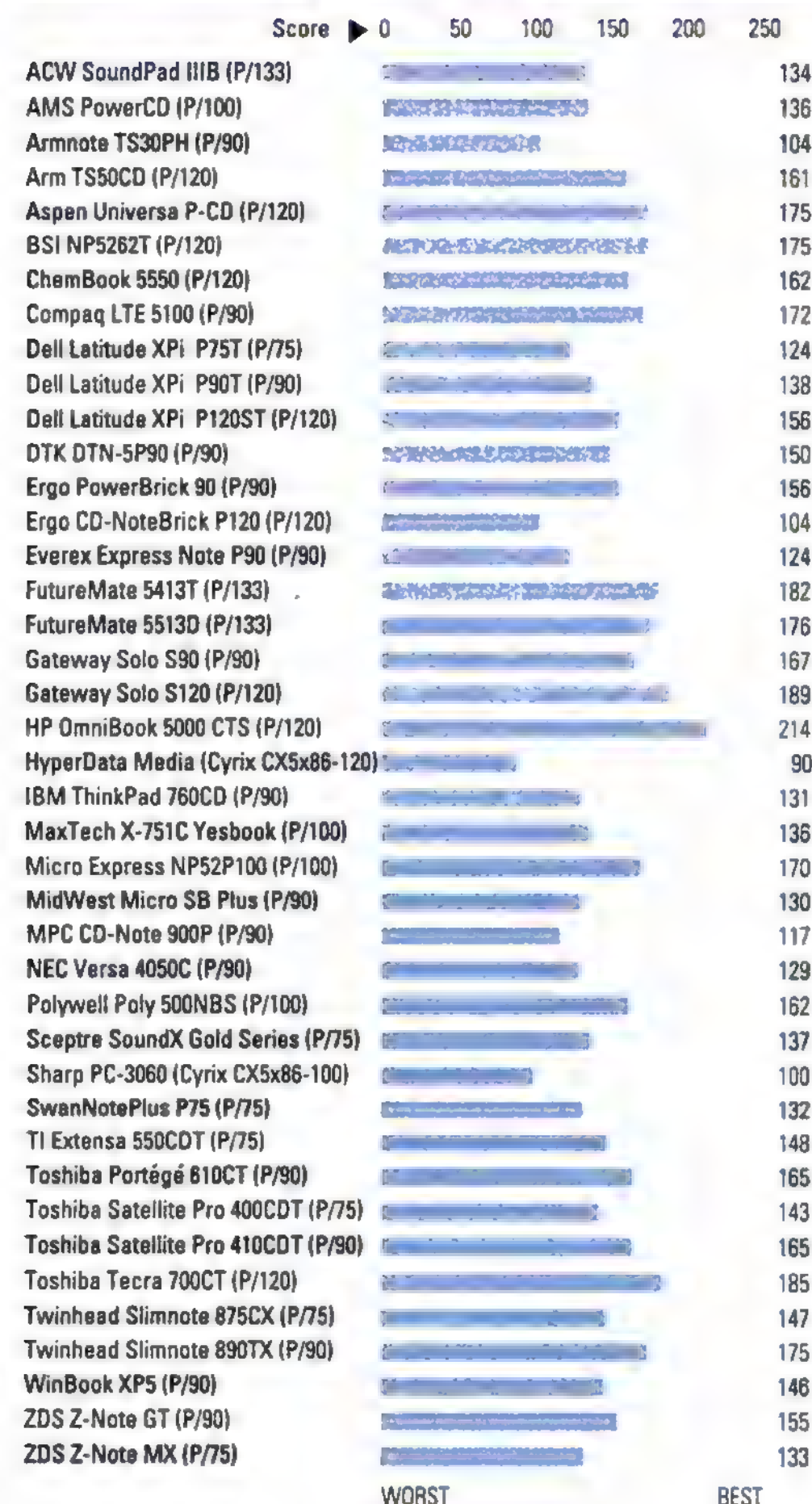
Notebook computers have never been able to perform on a par with desktop PCs. One of the reasons was the lack of L2 cache. In this review, however, only 6 of the 41 portables tested did not have L2 cache. And 4 of those 6 were Toshiba units that had

EDO DRAM or synchronous DRAM (in the Tecra 700CT) instead of L2 cache. But while L2 cache helps, there are many chip sets out there that may not offer the best of performance.

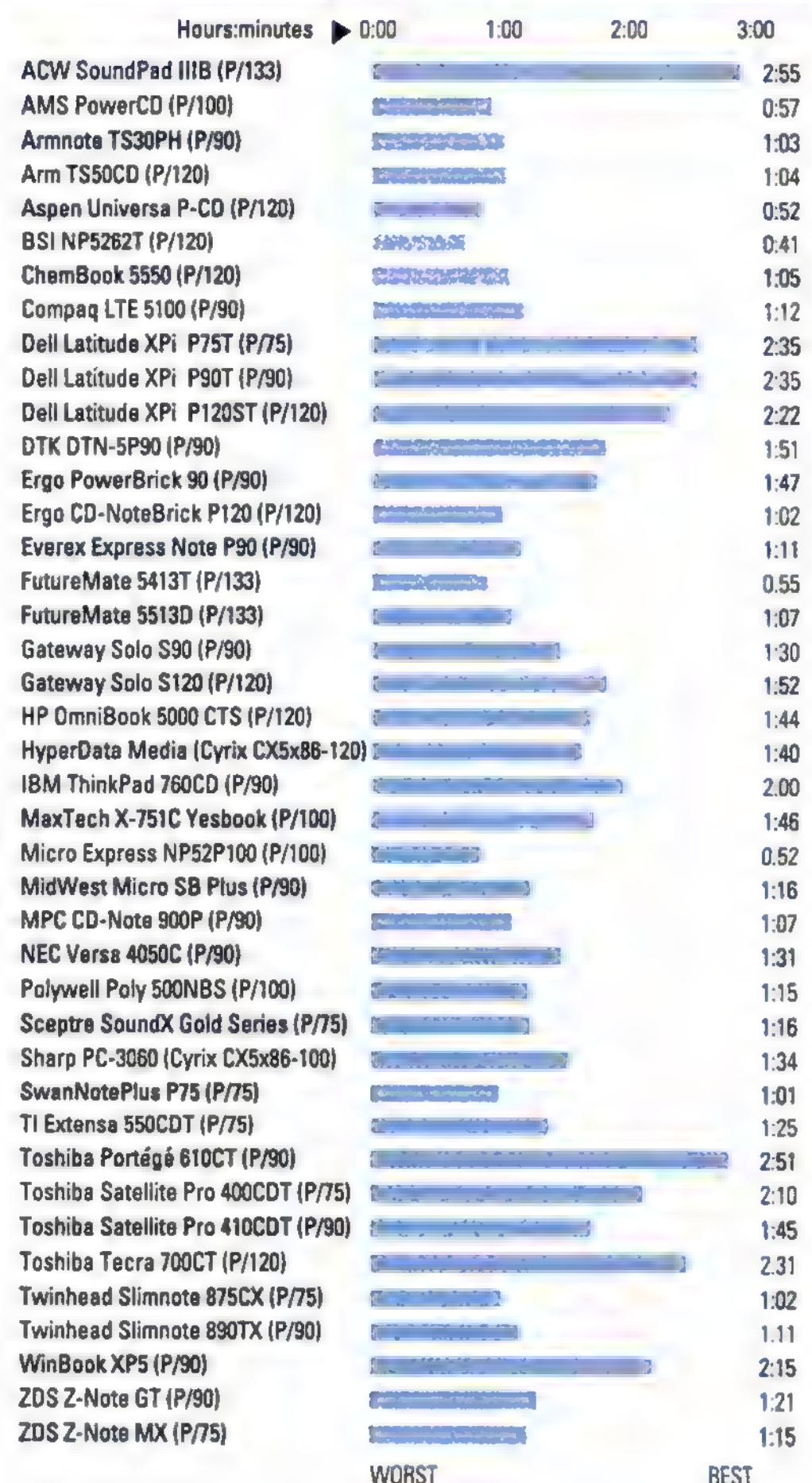
The systems from Toshiba were very intriguing. The Portégé 610CT, Satellite Pro 400CDT, and Satellite Pro 410CDT all had EDO DRAM and no L2 cache. Toshiba also uses its own chip set. Although the Toshiba systems had no L2 cache, they scored near the top of the charts on our CPUmark₃₂ tests in their respective processor categories. This is a big difference from our previous notebook roundup (August 1995), where a Toshiba Satellite T4900CT with no cache finished dead last compared with other Pentium-equipped notebooks on our CPU tests. We can only presume that Toshiba has tuned its chip set for better performance with EDO DRAM.

The Toshiba Tecra 700CT features a unique memory

CPUMARK₃₂



WINDRAIN



subsystem that uses synchronous DRAM. This new form of DRAM adds a high-speed clock to synchronize the flow of addresses, data, and control on and off the DRAM. The clock also facilitates pipelining of operations. SDRAMs can handle the higher clock speeds of the latest processors, allowing faster memory operation with burst data rates up to four times those of standard page-mode DRAMs. By using SDRAM for main memory, designers can reduce or eliminate microprocessor wait states without relying on expensive external cache. Toshiba appears to have come through with its design, the only catch being how much more SDRAM costs compared with standard DRAM and how much savings that translates into over a system with cache.

We also came across a couple of 486 chip sets that are

engineered to run with a Pentium processor. Pico Power's Golden Gate is a bridge chip set that runs with the company's Redwood 486 chip set. The Dell Latitude XPi systems, the IBM ThinkPad 760CD, and the NEC Versa 4050C all use the Golden Gate chip set. These units' scores on our CPUmark₁₆ and CPUmark₃₂ tests tended to be on the low side of average even though they all had L2 cache. We suspect that the bridge chip may be introducing extra timing cycles in order to have its 486 chip set run with a Pentium.

This roundup also provided us with our first look at Cyrix CX5x86 CPUs in notebooks. The HyperData Media Go CD-Note had a 120-MHz Cyrix CX5x86, while the Sharp PC-3060 had a 100-MHz Cyrix CX5x86. This Cyrix chip is based on a scaled-back version of Cyrix's 64-bit M1 CPU, with a 486 pinout

CD-ROM WINMARK '96

Score	0	50	10	15	20	25	30	35	40	45
ACW SoundPad IIIB (P/133)	N/A									
AMS PowerCD (P/100)										106
Armnote TS30PH (P/90)	N/A									
Arm TS50CD (P/120)										231
Aspen Universa P-CD (P/120)										228
BSI NP5262T (P/120)										234
ChemBook 5550 (P/120)										231
Compaq LTE 5100 (P/90)										197
Dell Latitude XPi P75T (P/75)	N/A									
Dell Latitude XPi P90T (P/90)	N/A									
Dell Latitude XPi P120ST (P/120)	N/A									
DTK DTN-5P90 (P/90)	N/A									
Ergo PowerBrick 90 (P/90)	N/A									
Ergo CD-NoteBrick P120 (P/120)										108
Everex Express Note P90 (P/90)										223
FutureMate 5413T (P/133)										235
FutureMate 5513D (P/133)										234
Gateway Solo S90 (P/90)										245
Gateway Solo S120 (P/120)										247
HP OmniBook 5000 CTS (P/120)	N/A									
HyperData Media (Cyrix CX5x86-120)										103
IBM ThinkPad 760CD (P/90)										417
MaxTech X-751C Yesbook (P/100)	N/A									
Micro Express NP52P100 (P/100)										231
MidWest Micro SB Plus (P/90)	N/A									
MPC CD-Note 900P (P/90)										120
NEC Versa 4050C (P/90)										202
Polywell Poly 500NBS (P/100)	N/A									
Sceptre SoundX Gold Series (P/75)	N/A									
Sharp PC-3060 (Cyrix CX5x86-100)	N/A									
SwanNotePlus P75 (P/75)	N/A									
TI Extensa 550CDT (P/75)										193
Toshiba Portégé 610CT (P/90)	N/A									
Toshiba Satellite Pro 400CDT (P/75)										435
Toshiba Satellite Pro 410CDT (P/90)										437
Toshiba Tecra 700CT (P/120)										435
Twinhead Slimnote 875CX (P/75)										240
Twinhead Slimnote 890TX (P/90)										242
WinBook XP5 (P/90)	N/A									
ZDS Z-Note GT (P/90)										219
ZDS Z-Note MX (P/75)	N/A									

WORST

BEST

N/A—Not applicable: The product does not have an internal CD-ROM drive

WINSTONE '96 SCORES BY CATEGORY

Higher scores represent better performance	Spread sheet	Word Processing	Data base	Business Graphics/DTP
ACW SoundPad IIIB P5-133 DS (P/133)	2.8	3.4	3.2	3.6
AMS PowerCD (P/100)	3.2	3.6	3.6	3.9
Armnote TS30PH (P/90)	3.8	3.0	4.2	3.3
Arm TS50CD (P/120)	3.7	4.2	4.2	4.5
Aspen Universa P-CD (P/120)	3.9	4.7	4.4	4.7
BSI NP5262T (P/120)	3.9	4.5	4.5	4.6
ChemBook 5550 (P/120)	3.8	4.2	4.2	4.5
Compaq LTE 5100 (P/90)	3.7	4.2	4.3	4.3
Dell Latitude XPi P75T (P/75)	3.0	3.5	3.4	3.6
Dell Latitude XPi P90T (P/90)	3.3	3.8	3.8	3.9
Dell Latitude XPi P120ST (P/120)	3.5	4.0	4.0	4.3
DTK DTN-5P90 (P/90)	3.6	4.0	4.0	4.2
Ergo PowerBrick 90 (P/90)	3.7	4.1	4.1	4.3
Ergo CD-NoteBrick P120 (P/120)	2.7	3.0	3.0	3.3
Everex Express Note P90 (P/90)	3.3	3.7	3.7	3.8
FutureMate 5413T (P/133)	3.9	4.6	4.6	4.7
FutureMate 5513D (P/133)	3.8	4.3	4.1	4.5
Gateway Solo S90 (P/90)	3.6	4.1	4.0	4.2
Gateway Solo S120 (P/120)	4.1	4.6	4.5	4.9
HP OmniBook 5000 CTS (P/120)	4.6	5.1	5.1	5.4
HyperData Media (Cyrix CX5x86-120)	2.4	2.8	2.7	3.1
IBM ThinkPad 760CD (P/90)	3.5	3.9	3.8	4.0
MaxTech X-751C Yesbook (P/100)	3.3	3.7	3.7	4.0
Micro Express NP52P100 (P/100)	3.8	4.4	4.4	4.4
MidWest Micro Sound Book Plus P5-90 (P/90)	3.4	4.0	4.0	4.2
MPC CD-Note 900P (P/90)	2.3	2.8	3.0	3.2
NEC Versa 4050C (P/90)	3.2	3.7	3.7	3.9
Polywell Poly 500NBS (P/100)	3.2	3.7	3.7	4.2
Sceptre SoundX Gold Series (P/75)	3.5	3.8	4.0	4.0
Sharp PC-3060 (Cyrix CX5x86-100)	2.7	3.0	3.0	3.2
SwanNotePlus P75 (P/75)	3.3	3.7	3.9	3.9
TI Extensa 550CDT (P/75)	3.2	3.7	3.6	3.8
Toshiba Portégé 610CT (P/90)	3.8	4.2	4.2	4.4
Toshiba Satellite Pro 400CDT (P/75)	3.4	3.8	3.9	4.0
Toshiba Satellite Pro 410CDT (P/90)	3.6	4.0	4.0	4.2
Toshiba Tecra 700CT (P/120)	3.9	4.3	4.3	4.7
Twinhead Slimnote 875CX (P/75)	3.1	3.6	3.8	3.7
Twinhead Slimnote 890TX (P/90)	3.9	4.3	4.4	4.5
WinBook XP5 (P/90)	3.6	4.1	4.1	4.2
ZDS Z-Note GT (P/90)	3.8	4.1	4.2	4.4
ZDS Z-Note MX (P/75)	3.3	3.7	3.7	3.9

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- 256KB L2 Cache
- 420MB Removable Hard Drive (1.2GB Max)
- Smart Lithium Ion Battery with Advanced Power Management
- 32-bit Local-bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Slots
- 6.2 Pounds
- Optional Dell Latitude DeskDock Available
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- 8MB RAM (40MB Max RAM)
- 256KB L2 Cache
- 420MB Removable Hard Drive (1.2GB Max)
- Smart Lithium Ion Battery with Advanced Power Management
- 32-bit Local-bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Slots
- 6.2 Pounds
- Optional Dell Latitude DeskDock Available
- 1 Year Warranty
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- 2 Type II/1 Type III PCMCIA Slots
- 6.2 Pounds
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SYSTEM NOT PICTURED

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- 8MB RAM (24MB Max RAM)
- 128KB L2 Cache
- 420MB Upgradeable Hard Drive (810MB Max)
- \$99 More for 2nd NiMH Battery (Slides into floppy drive to achieve extended battery life)
- 32-bit Local-bus Video, 1MB Video RAM
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Benchmark Tests: Color Pentium Notebooks

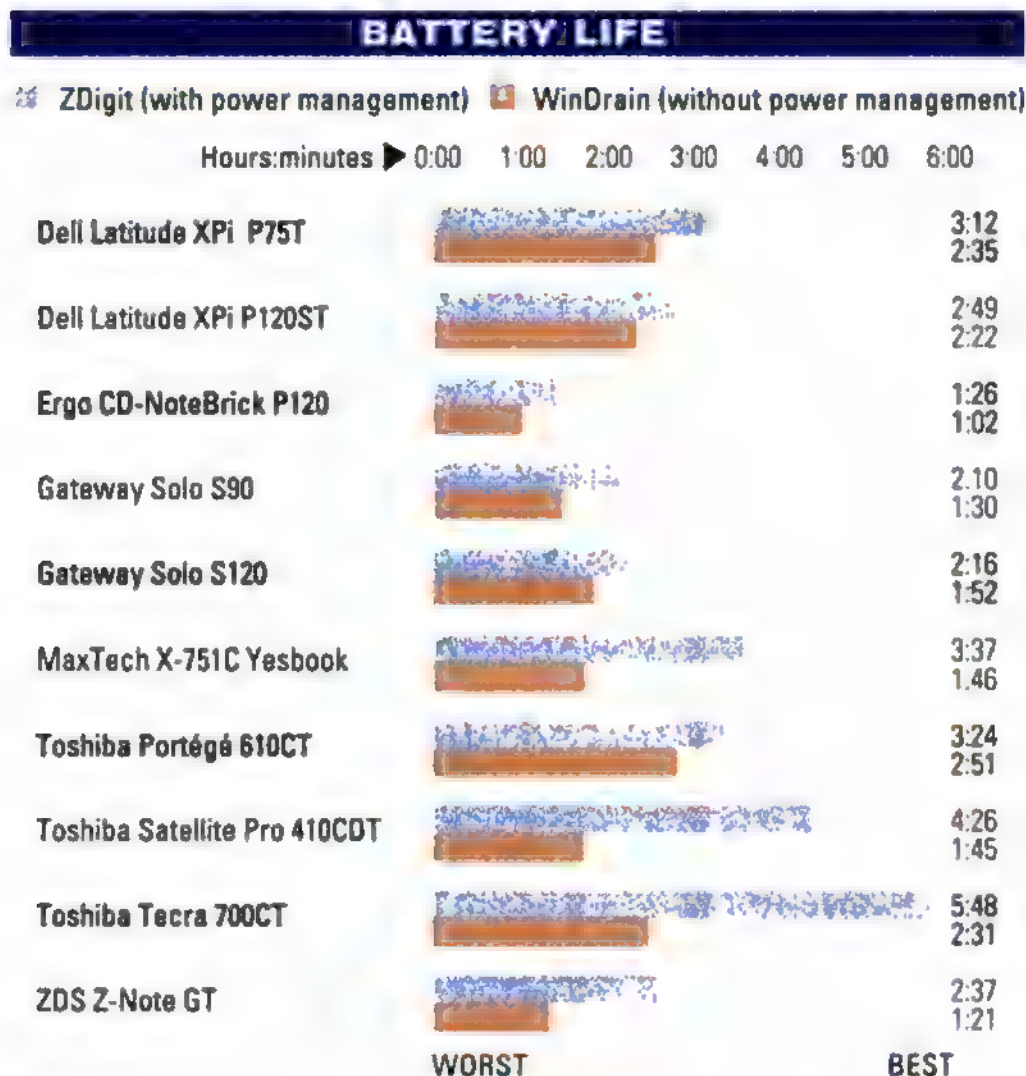
▲ Higher scores represent better performance.
▼ Lower scores represent better performance.

	CD-ROM WinMark 95	CD-ROM Sequential 16K Read (KBps)	CD-ROM Access Time (ms)	CD-ROM CPU Utilization (percent)	HIGH-QUALITY ACTION INDEO ¹ CPU Utilization (percent)	FULL-SCREEN SCALING ² Frames Dropped	FULL-SCREEN SCALING ² CPU Utilization (percent)	MEDIUM-QUALITY ACTION CINEPAK ³ Frames Dropped	MEDIUM-QUALITY ACTION CINEPAK ³ CPU Utilization (percent)
AMS PowerCD (Pentium/100)	106	305	593	67	99	445	99	241	99
Arm TS50CD (Pentium/120)	231	307	339	28	100	246	99	0	58
Aspen Universa P-CD (Pentium/120)	228	307	360	28	98	⊗	94	420	99
BSI NP5262T Pentium/120)	234	307	333	25	98	311	99	0	69
ChemBook 5550 (Pentium/120)	231	307	327	28	97	256	99	0	64
Compaq LTE 5100 (Pentium/90)	197	307	345	32	98	403	99	0	86
Ergo CD-NoteBrick P120 (Pentium/120)	108	306	506	68	99	407	99	0	96
Everex Express Note P90 (Pentium/90)	223	307	351	33	98	334	99	0	83
FutureMate 5413T (Pentium/133)	235	307	342	26	98	356	100	0	75
FutureMate 5513D (Pentium/133)	234	306	320	26	96	294	99	0	54
Gateway Solo S90 (Pentium/90)	245	308	327	26	98	313	99	0	69
Gateway Solo S120 (Pentium/120)	247	308	323	26	98	299	99	0	76
HyperData Media (Cyrix CX5x86-120)	103	306	554	60	100	218	99	0	76
IBM ThinkPad 760CD (Pentium/90)	417	614	259	41	99	0	81	0	66
Micro Express NP52P100 (Pentium/100)	231	307	332	24	97	272	99	0	64
MPC CD-Note 900P (Pentium/100)	120	307	354	40	97	286	99	0	65
NEC Versa 4050C (Pentium/90)	202	307	393	26	98	153	99	0	68
TI Extensa 550CDT (Pentium/75)	193	307	339	25	98	338	99	0	73
Toshiba Satellite Pro 400CDT (Pentium/75)	435	613	213	36	99	227	99	0	63
Toshiba Satellite Pro 410CDT (Pentium/90)	437	612	208	33	99	164	99	0	59
Toshiba Tecra 700CT (Pentium/120)	435	613	213	44	95	43	99	0	61
Twinhead Slimnote 875CX (Pentium/75)	240	307	292	25	98	380	99	0	80
Twinhead Slimnote 890TX (Pentium/90)	242	307	296	25	98	193	99	0	71
ZDS Z-Note GT (Pentium/90)	219	305	345	26	98	0	96	0	64

⊗ The unit's performance was too poor to measure.

1 With an Action, Indeo, 320 x 240, 30-fps, 600-KBps clip.
2 With an Action, Indeo, 160 x 120, 30-fps, 300-KBps clip scaled to full screen (1,024 x 768).
3 With an Action, Cinepak, 320 x 240, 30-fps, 300-KBps clip.

and many performance-enhancing features. These features include branch prediction and a 16K unified write-back L1 cache. Unlike the Pentium, the 5x86 has only one pipeline, but this single pipeline reduces the complexity of the chip's overall data path, thus allowing a reduced die size. Further, to reduce



costs, the 5x86 uses a 486 pinout to take advantage of lower-cost chip sets. Unfortunately the Cyrix-based systems did not come with L2 cache, so it's difficult to draw conclusions. In our previous notebook roundup we saw about a 25 percent improvement in CPUmark₁₆ performance (under PC Bench 9.0) with the addition of L2 cache. From that it could be extrapolated that if the Cyrix-based systems we tested had cache, they would perform just a bit slower than a Pentium/75-based notebook.

Finally, we saw the OPTi Viper N chip set for the first time. The Viper N supports the PCI bus (with burst mode), the VL-Bus, and pipeline burst cache. Systems that had a Viper N chip set tended to be the top scorers on our CPUmark₁₆ tests. The Pentium/120-based HP OmniBook 5000 CTS was our top CPUmark₁₆ performer, with a score of 223. The Compaq LTE 5100 was the top-scoring Pentium/90, with a score of 175, and Texas Instruments' Extensa 550CDT was the top-scoring Pentium/75, at 148 (scores refer to units' performance on our CPUmark₁₆ tests).

BATTERY LIFE

With Intel now selling Pentium/75, Pentium/90, and Pentium/120 chips in the Tape Carrier Package (TCP) enhanced with Voltage Reduction Technology (VRT), we saw a lot of systems using these processors. VRT allows the Pentium to communicate with existing 3.3-volt components while its internal core operates at 2.9 volts. This reduces battery drain compared with systems still using plastic-package CPUs.

We were able to test two identical WinBook XP5 Pentium/90 systems, one using a plastic-package chip and the other using a TCP processor with VRT. The notebook with the TCP processor was able to last about 14 percent longer on our WinDrain battery test than the system with the plastic-package CPU.

Except for the ACW SoundPad III B P5-133 DS, which comes with two nickel hydride batteries, all of the longest-lasting systems on our WinDrain test used lithium ion battery packs. The longest battery life was posted by the Toshiba Portégé 610CT: It lasted 2 hours 51 minutes on our WinDrain test. WinDrain is a heavy-usage test that keeps the unit completely active and does not use any power-conservation features.

We also ran our ZDigit test on a select few systems, which exercises the notebook in working and resting periods, to get a feel for battery life in more typical usage conditions. In many cases, battery life improved significantly on the ZDigit test thanks to power management and a less intensive usage pattern. (See the "Battery Life" chart.) Variances in the amount of increase can be attributed to the fact that some low-level, power-saving features may not be able to be turned off while WinDrain is running.

CD-ROM AND MULTIMEDIA TESTS

In this roundup we saw the first quad-speed CD-ROM drives in the IBM ThinkPad 760CD, Toshiba Satellite Pro 400CDT, Toshiba Satellite Pro 410CDT, and Toshiba Tecra 700CT. All other CD-ROM drives were double-speed. As expected, the quad-speed drives outperformed the double-speed drives on our CD-ROM WinMark 96 tests.

Graphics chip sets with built-in motion video enhancements have finally found their way into notebook PCs. The Toshiba Satellite Pro 410CDT, the Toshiba Tecra 700CT, and Zenith Data Systems' Z-Note GT all use the Chips & Technologies 65548 chip set. The C&T 65548 can support motion video by providing up to 80-MBps burst-mode transfers on the PCI bus. It enabled these systems to perform well on our Full-Screen Scaling test. This test stresses the video subsystem heavily.

The IBM ThinkPad 760CD also performed well thanks to its Trident 9320 chip set. This chip set helps accelerate software codecs like Cinepak and Indeo. The Trident 9320 has video scaling built-in; it showed its prowess by not dropping any frames when we scaled a 160-by-120 video clip up to 640-by-480.

How We Tested

We tested all notebooks with 16MB of RAM and 500MB or larger hard disks. We used each vendor's preinstalled graphics driver for 640-by-480 resolution with 256 colors and small fonts. We also disabled power-management features and removed unnecessary drivers. We defragmented hard disks before each test, and we let Windows 95 manage the virtual memory settings.

We used our benchmark test suite **Winstone 96, Version 1.0**, to measure the units' performance when running typical Windows applications. Winstone 96 measures the time a PC takes to execute a set of scripts that exercise 13 of the best-selling Windows applications. Winstone weights a given PC's test timings

based on the applications' unit market shares; it derives a composite number and converts it to a relative score. (The score is relative to the performance of a 486SX/25 Dell 425s/P with 8MB of RAM, whose score is defined as 10.) We also present separate Winstone 96 scores for four categories of applications: Spreadsheet, Word Processing, Database, and Business Graphics/DTP. Each of these scores is relative to that of the Dell 425s/P, whose score is defined as 1.

We used our benchmark test suite **WinBench 96, Version 1.0**, as a measure of graphics, disk, processor, CD-ROM, and motion-video performance under Windows. The **Graphics WinMark 96** score, a number based on 115 tests of Windows GDI (Graphics Device Interface) functions, represents the performance of each machine's graphics subsystem under Windows. The **Disk WinMark 96** score, a harmonic mean based on extensive application profiling, represents the disk subsystem's performance under Windows. The **CPU-mark₁₆** and **CPUmark₃₂** scores indicate the speed of a computer's processor subsystem under 16-bit and 32-bit Windows operating systems, respectively. WinBench 96 bases these scores on large instruction mixes that emulate the CPU activity of real-world applications. The processor subsystem includes the CPU, external processor cache, and system memory.

The **CD-ROM WinMark 96** score gauges the performance of each machine's CD-ROM subsystem, which includes the CD-ROM drive, the adapter to which it is connected, and the software drivers it requires to operate. This number is based on a profile of six of today's most popular Windows CD-ROM applications in three market categories: business and productivity, games and entertainment, and reference and education.

We also report the results of the **CD-ROM Sequential 16K Read** test, which measures the CD-ROM subsystem's throughput when reading 16K blocks of data on a CD-ROM. The **CD-ROM Access Time** score measures the CD-ROM drive's performance while it is randomly accessing 2K blocks from the entire CD-ROM.

We also use the **CD-ROM CPU Utilization** score to represent the percentage of the processor's bandwidth occupied in servicing the CD-ROM subsystem while it retrieves data. To determine the amount of utilization, WinBench 96 uses a default block size of 16K. The transfer rate defaults to the maximum transfer rate of your particular CD-ROM subsystem. WinBench 96 then calculates this transfer rate before it runs the actual test.

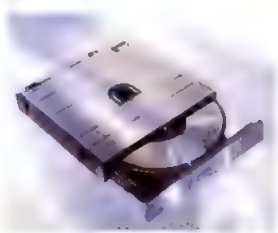
WinBench 96 also includes Video Test, a test suite composed of 33 video clips to measure the PC's ability to play full-motion AVI video files. This test suite allows you to test video playback performance with two types of clips at a variety of data and frame rates, using either the Indeo or Cinepak codec.

We report results from the **High-Quality Action Indeo** test (CPU utilization only), which uses the Action, Indeo, 320-by-240, 30-frame-per-second, 600-kilobyte-per-second video clip; the **Full-Screen Scaling** test, which uses the Action, Indeo, 160-by-120, 30-fps, 300-KBps video clip; and the **Medium-Quality Action Cinepak** test, which uses the Action, Cinepak, 320-by-240, 30-fps, 300-KBps video clip. We report both the number of frames dropped while playing each video clip and the CPU utilization, which measures the percentage of CPU resources used to run each video clip.

The **WinDrain** score reflects the life of a PC's battery under intensive use with the power management disabled (including Microsoft Advanced Power Management, where applicable) and the screen at full brightness. We determine the score by running our WinDrain program until the battery is depleted. We expect the WinDrain time to represent the minimum battery life of a notebook. WinDrain writes constantly to a file and updates the screen to keep it active. During the test, we prevent each notebook from entering a power-saving mode by feeding keystrokes, either through an external keyboard port or by using a hardware device that taps a key.



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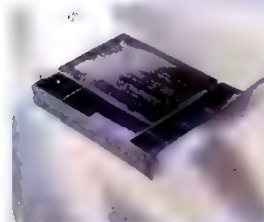


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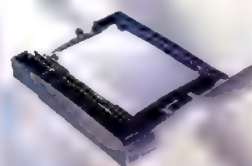


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Gateway Solo S120.

port. There are also two dedicated Windows 95 keys on the keyboard, one that activates the Start button and one that activates applications. Each Solo has FM-synthesis audio support with an integrated microphone and speakers. Gateway includes Microsoft Office 95 and a PC Card 28.8-Kbps fax modem with both Solos.

On our benchmark tests, the 90-MHz Solo posted average scores compared with its CPU group. The 120-MHz version garnered an above-average Graphics WinMark 96 score; its Winstone 96 and Disk WinMark 96 scores were both average for its class.

Gateway 2000 includes a one-year parts-and-labor warranty, with three years of on-site service for \$100.—WPF
Gateway Solo S90. Estimated street price: \$5,799. **Gateway Solo S120.** Street price: \$5,999. Gateway 2000 Inc., North Sioux City, SD; 800-846-4204, 605-232-2000; fax, 605-357-1023.

Circle 464 on reader service card

Hewlett-Packard Co.

HP OmniBook 5000 CTS

Hewlett-Packard Co.'s OmniBook line of notebooks has been a success story and the latest entry, the \$6,630 (street) 120-MHz Pentium-based

HP OmniBook 5000 CTS, continues to please.

The OmniBook is aimed at users who demand desktop-level performance on the road. The PCI-based unit represents the high end of HP's OmniBook 5000 series. Other versions with 75-MHz and 90-MHz Pentium CPUs and VL-Bus-based designs are also available.

The OmniBook has a removable 1.1GB hard disk, a trackball, a 10.5-inch active-matrix screen that supports 800-by-600 SVGA resolution internally, and a removable floppy disk drive that can be swapped for a second lithium ion battery. Its travel weight is an admirable 7.8 pounds.

The unit had a number of performance-boosting components, including an OPTi Viper-N chip set, 256K of pipelined-burst L2 cache, and 1.5MB of VRAM for its graphics subsystem. The system also features one Type III or two Type II PC Card slots, an NTSC video port, a SCSI-2 port, a MIDI/game port, audio jacks, and an IrDA-compliant infrared port.

The HP unit automatically installs into the \$699 OmniBook 5000 docking station. The docking station has one ISA slot and a shared ISA/PCI slot but no drive bays.

On our tests, the OmniBook pulled off a stunning sweep: It posted the best Winstone 96, Disk WinMark 96, Graphics WinMark 96, CPUmark₃₂, and CPUmark₁₆ scores in this entire roundup. Its lithium ion battery lasted a respectable 1 hour 44 minutes on our WinDrain battery test.

The OmniBook comes with a three-year warranty and a year of express exchange service by which defective parts are replaced via overnight delivery. No on-site service is available.—RSA

HP OmniBook 5000 CTS. Estimated street price: \$6,630. Hewlett-Packard Co., Corvallis, OR; 800-443-1254, 503-715-2004; fax, 503-715-5488; Web, <http://www.hp.com>.

Circle 465 on reader service card

HyperData Technology Corp.

HyperData Media Go CD-Note

HyperData Technology Corp.'s HyperData Media Go CD-Note is intended to be a corporate desktop replacement system at a desktop price. Despite having lower benchmark test results than Pentium-equipped notebooks, the HyperData machine (\$2,995 street) is still a good value, priced fairly for its performance.

HyperData keeps costs down by using a 120-MHz Cyrix CX5x86 processor, a 10-inch active-matrix screen, and a 500MB hard disk. At a road weight of 8.3 pounds, the HyperData unit also features a double-speed CD-ROM drive that you access by flipping up the keyboard.

Unlike many of the Pentium entries, the HyperData machine has no L2 cache. On our benchmark tests, the Media Go posted the lowest Winstone 96 and Disk WinMark 96 scores of all units reviewed but an average Graphics WinMark 96 score, thanks to its Chips & Technologies 65545 graphics chip set. Battery life was respectable: The nickel hydride-powered unit lasted 1:40 on the WinDrain test. A second battery is a \$120 option.



HyperData Media Go CD-Note.

The audio setup on the HyperData unit includes FM and wavetable support. On subjective video clip testing, there was not much noticeable frame dropping, but when clips were scaled to full-screen, the image was noticeably blocky.

The company did install Briefcase on the system but not Direct Cable Connection. A one-year parts-and-labor warranty is standard with the

SUITABILITY TO TASK

HP OmniBook 5000 CTS

Desktop replacement	Good
Road warrior	Good

SERVICE & RELIABILITY

Hewlett-Packard Co.

Reliability	Better than average
Repair	Average
Technical support	Better than average
% needing repair	Better than average

SUITABILITY TO TASK

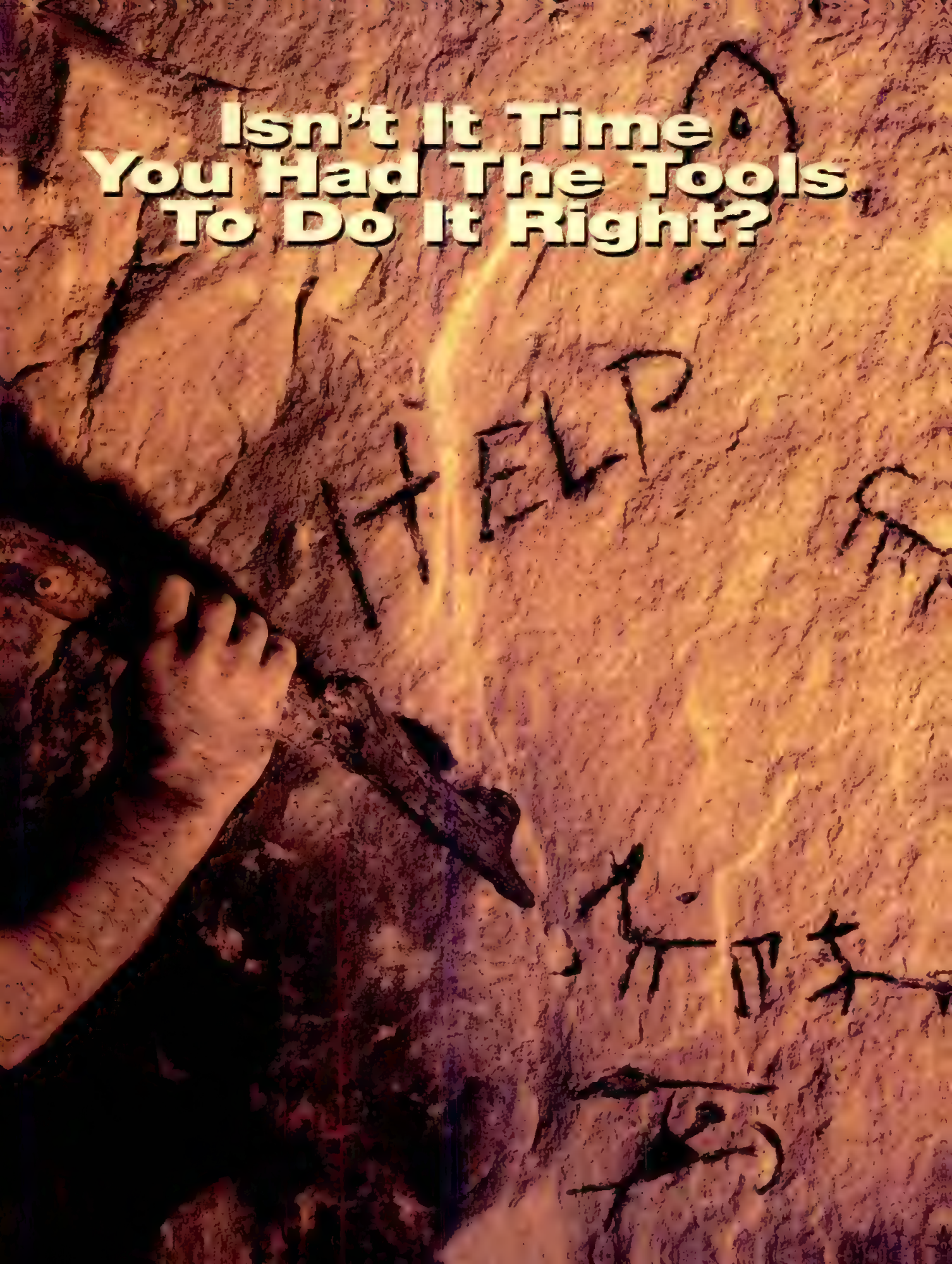
HyperData Media Go CD-Note

Desktop replacement	Good
Road warrior	Fair



HP OmniBook 5000 CTS.

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120MHz	\$1795	120MHz	\$2395	120MHz	\$2795	120MHz	\$3195
133MHz	\$1895	133MHz	\$2495	133MHz	\$2895	133MHz	\$3295
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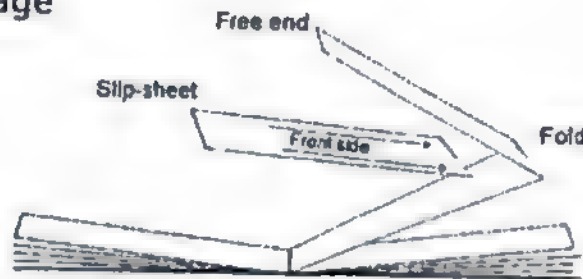
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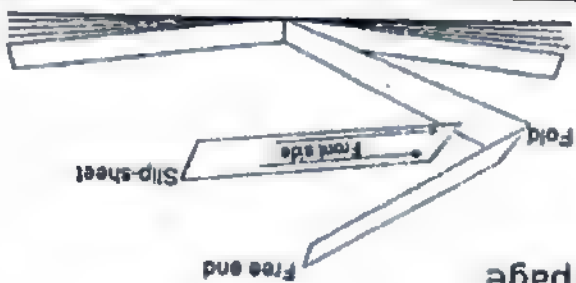
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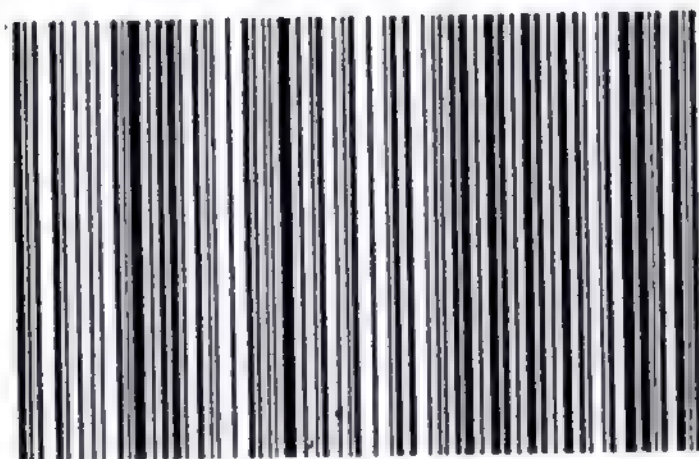
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Circle 466 on reader service card

IBM Personal Computer Co.

IBM ThinkPad 760CD



The IBM ThinkPad 760CD (\$7,924 street) is IBM's flagship portable: It's a desktop replacement for business users and a portable presentation system with MPEG-2 capability for business travelers and people in the entertainment business. The Pentium/90-based ThinkPad—a recipient of *PC Magazine's* 1995 Technical Excellence Award—meets its charges ably, with a 12.2-inch SVGA display, quad-speed CD-ROM drive, and internal 28.8/14.4-Kbps data/fax modem.

The 8.4-pound (travel weight) unit has one infrared port in front and one in back. FaxWorks with Voice provides a full-duplex speakerphone and digital answering machine. The audio system has 16-bit wavetable synthesis and MIDI support.

The CD-ROM drive, floppy disk drive, 1.1GB hard disk, and battery are easy to access—just lift the keyboard to change components. The unit lasted 2 hours on our WinDrain battery test. A second lithium ion battery is a \$279 option.

The ThinkPad, equipped with 256K of pipelined-burst L2 cache, had top-of-the-class Disk WinMark and Graphics WinMark 96 scores. The unit's Winstone 96 score was average. On video testing it was one of the top performers, with only a few dropped frames at the fastest video clip rates.

The unit comes bundled with Asymetix's Compel and Digital Video Producer, Lotus ScreenCam for Windows,

SUITABILITY TO TASK	
IBM ThinkPad 760CD	
Desktop replacement	Excellent
Road warrior	Excellent

SERVICE & RELIABILITY	
IBM Personal Computer Co.	
Reliability	Better than average
Repair	Better than average
Technical support	Better than average
% needing repair	Average

Price of tested configuration For notebooks sold through resellers, assume that street prices will be 15 to 20 percent lower than list prices. Some companies factor this discount into their quoted prices; in such cases, we indicate that the cited price is a street price

System weight, travel weight The system weight includes the weight of the battery. The travel weight adds the weight of the AC adapter, the power cord, and the CD-ROM drive. It does not include the weight of an external floppy disk drive, or a floppy disk drive that swaps for a CD-ROM drive

Installed RAM Some notebooks use EDO (extended data out) DRAM, which can marginally boost performance over standard fast page-mode DRAM

Virtual desktop When you use the notebook's LCD panel and an external monitor simultaneously, virtual desktop lets you display a higher resolution on the external monitor than the LCD panel is normally capable of displaying

Installed/maximum hard disk capacity We report capacity in megabytes (units of 1,048,576 bytes). Some manufacturers quote millions of bytes (which makes capacity appear about 5 percent larger) on spec sheets

NTSC video in/out These ports meet specifications set by the National Television Standards Committee, and allow you to output directly to a television set

PC Card slots These were formerly called PCMCIA slots.



IBM ThinkPad 760CD.

and MindPath Presentation F/X. The system is backed by a three-year warranty with three years of on-site service.—BB

IBM ThinkPad 760CD. Estimated street price: \$7,924. IBM Personal Computer Co., Research Triangle Park, NC; 800-426-2968; fax, 800-426-4329; Web, <http://www.ibm.com>.

Circle 467 on reader service card

MaxTech Corp.

X-751C Yesbook

If you're looking for a low-cost Pentium notebook without extras such as an internal CD-ROM drive, MaxTech's X-751C Yesbook is a reasonable choice. The \$2,595 street price includes a 100-MHz processor, 256K of external processor cache, a 772MB hard disk, and a 10.4-inch dual-scan color display. The Yesbook is positioned as a medium-configuration

machine for companies that might choose to upgrade the unit with active-matrix screens or larger hard disks for users with specific needs.

Lighter than many notebooks, the Yesbook weighs 7.7 pounds with its small AC adapter, and measures a relatively compact 1.9 by 11.4 by 8.8 inches (HWD). An internal floppy disk drive, an infrared port, and FM-synthesis stereo audio are standard, as is a GlidePoint touch pad (a pointing stick is also available for an extra \$30). A mini docking station with one ISA and one PCI slot and duplicate ports is available for \$330.

On all tests, including Winstone 96, Graphics WinMark, and Disk WinMark 96, the Yesbook was an average performer within the 100-MHz Pentium class. The Yesbook ran for 1 hour 46 minutes on our exhaustive WinDrain test. An extra nickel hydride battery



X-751C Yesbook.

SUMMARY OF FEATURES

Color Pentium Notebooks

■ YES . NO

Products listed in alphabetical order

	ACW SoundPad III B P5-133 DS	AMS PowerCD	Armnote TS30PH	Arm TS50CD	Aspen Universa P-CD	BSI NP5262T	ChemBook 5550	Compaq LTE 5100
Price (tested configuration)	\$2,999 (street)	\$4,125 (list)	\$3,599 (street)	\$4,299 (street)	\$3,875 (street)	\$4,005 (street)	\$3,965 (street)	\$6,428 (street)
System weight/Travel weight (pounds)	8.0, 9.3	7.7, 9.0	6.8, 8.0	8.2, 9.4	8.2, 9.4	8.2, 9.4	7.9, 9.2	7.7, 8.6
Dimensions (HWD, in inches)	2.9 x 11.8 x 8.5	2.1 x 11.6 x 8.6	2.0 x 10.9 x 8.6	2.8 x 11.6 x 9.9	2.4 x 11.8 x 8.9	2.3 x 11.8 x 9.0	2.4 x 11.6 x 10.2	2.1 x 12.1 x 9.0
Motherboard Components								
Processor type and speed	Pentium/133	Pentium/100	Pentium/90	Pentium/120	Pentium/120	Pentium/120	Pentium/120	Pentium/90
Installed/maximum system RAM	16MB, 40MB	16MB, 40MB	16MB, 16MB	16MB, 32MB	16MB, 32MB	16MB, 40MB	16MB, 32MB	16MB, 72MB
Installed external RAM cache and type	256K asynchronous	256K asynchronous	256K pipelined burst	256K synchronous	256K synchronous	256K asynchronous	256K asynchronous	256K synchronous
Motherboard manufacturer	Sunrex	ACC	Full Power Investment	Dual Technology	Kapok	Kapok	Dual Technology	Inventec
Chip set manufacturer and model	OPTi Python 82C546	ACC Micro 2056	VLSI SuperCore 590	ACC Micro 2056	UMC 8890	UMC 8890	ACC Micro 2056	OPTi Viper 558N
BIOS manufacturer and version (or date)	AMI (7/7/95)	Phoenix 4.04	Phoenix 4.04	AMI MPC-5.5.3	SystemSoft 1.10	SystemSoft 1.10	AMI MPC-5.5.3	SystemSoft 1.17
Flash BIOS/Plug and Play BIOS	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Display								
LCD-panel specifications	10.4" dual-scan SVGA	10.0" active- matrix VGA	10.4" active- matrix VGA	11.3" dual-scan SVGA	10.4" active- matrix VGA	10.4" active- matrix VGA	10.1" active- matrix VGA	10.5" active- matrix SVGA
Graphics chip set manufacturer and model	C&T 65545	Cirrus CL-GD7543	C&T 65545	C&T 65545	Cirrus CL-GD7543	Cirrus CL-GD7543	C&T 65545	Cirrus CL-GD7543
Graphics RAM and type	1MB DRAM	2MB VRAM	1MB VRAM	1MB EDO DRAM	2MB VRAM	2MB DRAM	1MB VRAM	1MB VRAM
Resolutions and noninterlaced refresh rates supported on external display	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	640 x 480 at 72 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 72 Hz, 1,024 x 768 at 72 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 72 Hz, 1,024 x 768 at 72 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 75 Hz
Simultaneous external display	■	■	■	■	■	■	■	■
Virtual desktop	■	■	■	■	■	■	■	■
Mass Storage								
Hard disk manufacturer and model	Seagate ST9655AG	IBM DVAA 2810	Toshiba MK1926FCV	Toshiba MK2720FC	Toshiba MK2720FC	Toshiba MK2720FC	IBM DVAA-2810	Toshiba MK2628FC
Installed/maximum hard disk capacity	500MB, 1.2GB	751MB, 1.2GB	777MB, 1.3GB	1.3GB, 1.3GB	1.3GB, 1.3GB	1.3GB, 1.3GB	772MB, 1.3GB	772MB, 1.3GB
Floppy disk drive	External	Swappable	Internal	Swappable	Internal	Internal	Swappable	Swappable
Multimedia Features								
CD-ROM manufacturer and model	None	Philips ACD-221	None	TEAC CD-40E	TEAC CD-40E	TEAC CD-40E	TEAC CD-40E	TEAC CD-40E
CD-ROM speed and interface	None	2X ATAPI	None	2X SCSI	2X ATAPI	2X ATAPI	2X ATAPI	2X ATAPI
Sound synthesis	FM	FM	FM, wavetable	FM, wavetable	FM	FM	FM	FM
Built-in speakers	■	■	■	■	■	■	■	■
Line-in/line-out jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Microphone/speaker jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
NTSC video in/out	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Communications and Expansion								
Modem installed/infrared interface	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Serial/parallel/VGA ports	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
External keyboard and mouse ports	Keyboard only	Shared port	Shared port	Both	Keyboard only	Shared port	Both	Shared port
16550 UART/ECP/EPP support	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
PC Card slots	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	One Type II/III and one Type II	Two Type II or one Type III	Two Type II or one Type III	One Type II and one Type III	Two Type II or one Type III
Input Devices								
Full-size alphanumeric/cursor keys	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Type of integrated pointing device	Trackball	Touch pad	Trackball	Pointing stick	Touch pad	Touch pad	Pointing stick	Pointing stick
Power								
Battery type	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride
Rated charge time while on/off (hours:minutes)	2:00, 1:10	4:00, 2:00	8:00, 1:30	4:00, 1:30	4:00, 1:50	3:00, 3:30	3:00, 2:00	3:00, 1:30
Standby/hibernation mode	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Battery hot-swapping/Smart battery	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Service and Support								
Standard warranty on parts/labor	1 year/1 year	3 years/3 years	1 year/3 years	1 year/3 years	1 year/2 years	1 year/1 year	1 year/1 year	3 years/3 years
On-site service charge (first year)	\$89.95	N/A	Included	Included	N/A	N/A	N/A	\$149.00
24-hour, 7-day live technical support	■	■	■	■	■	■	■	■

N/A—Not applicable: The product does not have this feature

Dell Latitude XPI P75T	Dell Latitude XPI P90T	Dell Latitude XPI P120ST	DTK DTN-5P90	Ergo PowerBrick 90	Ergo CD- NoteBrick P120	Everex Express Note P90	FutureMate 5413T	FutureMate 5513D	Gateway Solo S90
\$3,899 (street)	\$4,399 (street)	\$5,099 (street)	\$3,590 (street)	\$3,795 (street)	\$3,895 (street)	\$4,295 (street)	\$3,729 (street)	\$3,495 (street)	\$5,799 (street)
6.2, 7.1	6.2, 7.1	6.2, 7.1	7.1, 8.4	6.7, 7.9	7.0, 8.3	7.2, 8.2	8.1, 9.3	8.0, 9.3	6.4, 7.4
2.0 x 10.9 x 8.5	2.0 x 10.9 x 8.5	2.0 x 10.9 x 8.5	2.2 x 11.1 x 9.4	2.0 x 11.0 x 10.2	2.2 x 11.5 x 8.5	2.3 x 11.7 x 9.0	2.4 x 11.8 x 8.9	2.4 x 11.6 x 10.0	2.0 x 11.8 x 8.8
Pentium/75	Pentium/90	Pentium/120	Pentium/90	Pentium/90	Pentium/120	Pentium/90	Pentium/133	Pentium/133	Pentium/90
16MB, 40MB	16MB, 40MB	16MB, 40MB	16MB, 40MB	16MB, 40MB	16MB, 64MB	16MB, 40MB	16MB, 32MB	16MB, 32MB	16MB, 40MB
256K synchronous	256K synchronous	256K synchronous	256K synchronous	256K asynchronous	256K asynchronous	256K synchronous	256K synchronous	256K synchronous	256K pipelined burst
Dell	Dell	Dell	Clevo	Arima	Sunrex	First International	Kapok	Dual Technology	Sanyo
Pico Power Golden Gate	Pico Power Golden Gate	Pico Power Golden Gate	ACC Micro 2056	ACC Micro 2056	VIA VT82C575MV	OPTi Viper 558N	UMC 8890	ACC Micro 2056	OPTi Viper 558N
Phoenix 4.04	Phoenix 4.04	Phoenix 4.04	AMI 1.04	Phoenix 4.04	AMI (5/95)	Phoenix Notebios 4.0	SystemSoft 1.10	AMI 5.53	SystemSoft 1.17
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
10.4" active- matrix VGA	10.4" active- matrix VGA	10.4" active- matrix SVGA	10.0" active- matrix VGA	10.0" active- matrix VGA	10.4" dual-scan SVGA	10.4" active- matrix VGA	10.5" active- matrix VGA	11.3" dual-scan SVGA	10.4" active- matrix SVGA
Cirrus CL-GD7543	Cirrus CL-GD7543	Cirrus CL-GD7543	C&T 65545	C&T 65545	C&T 65545	Cirrus CL-GD7543	Cirrus CL-GD7543	C&T 65545	C&T 65545
1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB VRAM	1MB DRAM	2MB VRAM	1MB VRAM	1MB DRAM
800 x 600 at 60 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 100 Hz, 1,024 x 768 at 76 Hz	800 x 600 at 56 Hz, 1,024 x 768 at 56 Hz	800 x 600 at 76 Hz, 1,024 x 768 at 76 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
Seagate ST9655AG	IBM DVAA-2810	IBM DPRA-21215	IBM DVAA-2810	Toshiba MK1924FCV	Toshiba MK2528FC	Toshiba MK1926FCV	Toshiba MK1926FCV	Toshiba MK1926FCV	Toshiba MK2720FC
500MB, 1.2GB	773MB, 1.3GB	1.1GB, 1.2GB	772MB, 810MB	517MB, 1.3GB	670MB, 1.3GB	777MB, 810MB	776MB, 1.3GB	776MB, 1.3GB	1.2GB, 1.2GB
Internal	Internal	Internal	Internal	Internal	External	Swappable	Internal	Swappable	Swappable
None	None	None	None	None	Philips ROM6010 UJDCD2720	TEAC CD-40E	TEAC CD-40E	TEAC CD-40E	Matsushita UJDCD2720
None	None	None	None	None	2X ATAPI	2X ATAPI	2X ATAPI	2X ATAPI	2X ATAPI
None	None	None	FM, wavetable	FM	FM	FM	FM	FM	FM
■	■	■	■	■	■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Shared port	Shared port	Shared port	Both	Keyboard only	Keyboard only	Shared port	Shared port	Both	Shared port
■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	One Type II/III and one Type II	Two Type II or one Type III
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Trackball	Trackball	Trackball	Trackball	Trackball	Pointing stick	Touch pad	Touch pad	Pointing stick	Touch pad
Lithium ion	Lithium ion	Lithium ion	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Lithium ion
1:30, 1:30	1:30, 1:30	1:30, 1:30	2:30, 2:30	4:00, 2:30	4:00, 2:00	3:00, 1:30	3:00, 2:00	3:00, 2:00	2:30, 2:30
■ ■	■ ■	■ ■	■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
3 years/1 year Included	3 years/1 year Included	3 years/1 year Included	1 year/1 year N/A	4 years/4 years N/A	4 years/4 years N/A	3 years/3 years N/A	1 year/1 year N/A	1 year/1 year N/A	1 year/1 year N/A
■	■	■	■	■	■	■	■	■	■

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SUMMARY OF FEATURES

Color Pentium Notebooks



	Gateway Solo S120	HP OmniBook 5000 CTS	HyperData Media Go CD-Note	IBM ThinkPad 760CD	MaxTech X-751C Yesbook	Micro Express NP52P100	MidWest Micro Sound Book Plus P5-90	MPC CD-Note 900P
■ YES ■ NO								
Products listed in alphabetical order								
Price (tested configuration)	\$5,999 (street)	\$6,630 (street)	\$2,995 (street)	\$7,924 (street)	\$2,595 (street)	\$4,449 (street)	\$3,499 (street)	\$3,789 (street)
System weight/Travel weight (pounds)	6.4, 7.4	6.9, 7.8	7.1, 8.3	7.5, 8.4	6.7, 7.7	8.2, 9.3	6.7, 8.0	8.1, 9.4
Dimensions (HWD, in inches)	2.0 x 11.8 x 8.8	2.0 x 11.8 x 8.9	2.5 x 11.5 x 8.8	2.2 x 11.6 x 8.3	1.9 x 11.4 x 8.8	2.2 x 11.9 x 9.0	2.0 x 10.9 x 8.5	2.3 x 11.7 x 10.1
Motherboard Components								
Processor type and speed	Pentium/120	Pentium/120	Cyrix 5x86-120	Pentium/100	Pentium/100	Pentium/100	Pentium/90	Pentium/90
Installed/maximum system RAM	16MB, 40MB	16MB, 32MB	16MB, 32MB	16MB, 40MB	16MB, 24MB	16MB, 32MB	16MB, 40MB	16MB, 32MB
Installed external RAM cache and type	256K pipelined burst	256K pipelined burst	None	256K pipelined burst	256K asynchronous	256K asynchronous	256K asynchronous	256K synchronous
Motherboard manufacturer	Sanyo	HP	Sunrex	IBM	MaxTech	Full Power Investment	Compal	Dual Technology
Chip set manufacturer and model	OPTi Viper 558N	OPTi Viper 558N	OPTi 465MVA	Pico Power Golden Gate	ACC Micro 2056	UMC 8886	VLSI SuperCore 590	ACC Micro 2056
BIOS manufacturer and version (or date)	SystemSoft 1.17	SystemSoft 7.0	AMI (7/4/95)	IBM (9/4/95)	Phoenix 7.0	UMC 8890	Phoenix 4.04	AMI MPC 5.5
Flash BIOS/Plug and Play BIOS	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Display								
LCD-panel specifications	10.4" active-matrix SVGA	10.5" active-matrix VGA	10.0" active-matrix SVGA	12.2" active-matrix SVGA	10.4" dual-scan VGA	10.4" active-matrix VGA	10.4" active-matrix VGA	10.3" active-matrix SVGA
Graphics chip set manufacturer and model	C&T 65545	C&T 65545	C&T 65545	Trident 9320	C&T 65545	Cirrus CL-GD7543	C&T 65545	C&T 65545
Graphics RAM and type	1MB DRAM	1.5MB VRAM	1MB DRAM	1MB VRAM	1MB DRAM	2MB VRAM	1MB VRAM	1MB DRAM
Resolutions and noninterlaced refresh rates supported on external display	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 72 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 76 Hz, 1,024 x 768 at 76 Hz	800 x 600 at 72 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 56 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz
Simultaneous external display	■	■	■	■	■	■	■	■
Virtual desktop	1/2	■	■	■	1/2	1/2	■	1/2
Mass Storage								
Hard disk manufacturer and model	Toshiba MK2720FC	IBM DPRA-21215	Seagate ST9655AG	IBM DPRA-21215	Seagate ST9816AG	Toshiba MK1926FCV	IBM DBOA-2720	Toshiba MK2720FC
Installed/maximum hard disk capacity	1.2GB, 1.2GB	1.1GB, 1.3GB	500MB, 1.3GB	1.1GB, 1.1GB	772MB, 810MB	776MB, 1.2GB	688MB, 1GB	1.3GB, 1.3GB
Floppy disk drive	Swappable	Swappable	External	Swappable	Internal	Internal	Internal	Swappable
Multimedia Features								
CD-ROM manufacturer and model	Matsushita UJDCD2720	None	Philips ROM6010	TEAC CD-44E	None	TEAC CD-40E	None	TEAC CD-40E
CD-ROM speed and interface	2X ATAPI	None	2X ATAPI	4x ATAPI	None	2X ATAPI	None	2X ATAPI
Sound synthesis	FM	FM, wavetable	FM, wavetable	Wavetable	FM	FM, wavetable	FM	FM
Built-in speakers	■	■	■	■	■	■	■	■
Line-in/line-out jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Microphone/speaker jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
NTSC video in/out	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Communications and Expansion								
Modem installed/infrared interface	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Serial/parallel/VGA ports	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
External keyboard and mouse ports	Shared port	Both	Both	Both	Shared port	Shared port	Shared port	Both
16550 UART/ECP/EPP support	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
PC Card slots	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	One Type II/III and one Type II
Input Devices								
Full-size alphanumeric/cursor keys	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Type of integrated pointing device	Touch pad	Trackball	Pointing stick	Pointing stick	Touch pad	Touch pad	Pointing stick	Pointing stick
Power								
Battery type	Lithium ion	Lithium ion	Nickel hydride	Lithium ion	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride
Rated charge time while on/off (hours:minutes)	2:30, 2:30	4:00, 2:00	4:00, 2:00	3:00, 2:30	2:00, 1:30	4:00, 3:00	8:00, 1:30	1:30, 1:30
Standby/hibernation mode	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Battery hot-swapping/Smart battery	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Service and Support								
Standard warranty on parts/labor	1 year/1 year	3 years/3 years	1 year/1 year	3 years/3 years	1 year/1 year	2 years/2 years	3 years/3 years	1 year/1 year
On-site service charge (first year)	N/A	N/A	\$99.00	Included (3 years)	N/A	N/A	N/A	N/A
24-hour, 7-day live technical support	■	■	■	■	■	■	■	■

N/A—Not applicable: The product does not have this feature



NEC Versa 4050C	Polywell Poly 500NBS	Sceptre SoundX Gold Series	Sharp PC-3060	SwanNotePlus P75	TI Extensa 550CDT	Toshiba Portégé 610CT	Toshiba Satellite Pro 400CDT	Toshiba Satellite Pro 410CDT	Toshiba Tecra 700CT
\$5,723 (street)	\$3,745 (street)	\$3,450 (street)	\$3,098 (list)	\$2,978 (street)	\$4,198 (street)	\$4,678 (list)	\$4,678 (list)	\$5,378 (list)	\$5,999 (list)
7.2, 7.9	7.4, 8.3	6.3, 7.1	6.2, 7.1	6.0, 6.7	7.4, 8.5	4.7, 5.5	7.3, 7.6	7.3, 7.6	7.9, 9.0
2.3 x 11.6 x 9.4	2.1 x 11.0 x 8.5	2 x 11.1 x 8.7	2.3 x 11.3 x 8.9	2.0 x 11.0 x 8.5	2.4 x 11.6 x 8.9	1.9 x 9.9 x 7.9	2.1 x 11.9 x 9.0	2.1 x 11.9 x 9.0	2.3 x 11.7 x 9.0
Pentium/90	Pentium/100	Pentium/75	Cyrix 5x86-100	Pentium/75	Pentium/75	Pentium/90	Pentium/75	Pentium/90	Pentium/120
16MB, 40MB	16MB, 40MB	16MB, 40MB	16MB, 40MB	16MB, 40MB	16MB, 40MB	16MB EDO, 40MB	16MB EDO, 40MB	16MB EDO, 40MB	16MB SDRAM, 48MB
256K synchronous	256K asynchronous	256K synchronous	None	256K asynchronous	256K synchronous	None	None	None	None
NEC	Kapok	Compal	First International	Compal	Texas Instruments	Toshiba	Toshiba	Toshiba	Toshiba
Pico Power Golden Gate	ACC Micro 2056	VLSI Wildcat 594	UMC UM84846F	Pico Power VTI-590	OPTi Viper 558N	Toshiba	Toshiba	Toshiba	Toshiba
Phoenix 1.45	SystemSoft (6/20/94)	Phoenix (8/29/95)	Phoenix A486 1.03	Phoenix 4.04	Phoenix Notebios 4.0	Toshiba 5.0	Toshiba 5.3	Toshiba 5.0	Toshiba 1.02
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
10.1" active-matrix SVGA	10.0" active-matrix VGA	10.4" dual-scan VGA	10.1" dual-scan VGA	10.4 dual-scan VGA	10.4" active-matrix VGA	9.5" active-matrix VGA	10.4" active-matrix VGA	11.3" active-matrix SVGA	11.3" active-matrix SVGA
C&T 65545	C&T 65545	C&T 65545	C&T 65545	C&T 65548	Cirrus CL-GD7543	C&T 65546	C&T 65546	C&T 65548	C&T 65548
1MB VRAM	1MB DRAM	1MB DRAM	1MB VRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB EDO DRAM
800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 75 Hz, 1,024 x 768 at 75 Hz
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
Toshiba MK1926FCV	Toshiba MK2720FC	Toshiba MK1924FCV	Hitachi DK211A-54	Toshiba MK1926FCV	Seagate ST9655AG	IBM DB0A-2720	Toshiba MK1926FCV	Toshiba MK1926FCV	IBM DPRA-21215
777MB, 810MB Swappable	1.3GB, 1.3GB Internal	517MB, 810MB Swappable	504MB, 504MB Internal	777MB, 810MB Swappable	500MB, 524MB Swappable	687MB, 687MB External	776MB, 810MB External	776MB, 776MB Swappable	1.1GB, 1.2GB Swappable
TEAC CD-40E	None	None	None	None	TEAC CD-40E	None	Toshiba XM-1202B	Toshiba XM-1202B	Toshiba XM-1202B
2X ATAPI	None	None	None	None	2X ATAPI	None	4X ATAPI	4X ATAPI	4X ATAPI
FM	FM	FM, wavetable	FM, wavetable	FM	FM, wavetable	FM	FM, wavetable	FM, wavetable	FM
■	■	■	■	■	■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Both	Keyboard only	Shared port	Shared port	None	Both	None	Shared port	Shared port	Both
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Touch pad	Trackball	Touch pad	Touch pad	Touch pad	Touch pad	Pointing stick	Pointing stick	Pointing stick	Pointing stick
Lithium ion	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Nickel hydride	Lithium ion	Lithium ion	Lithium ion	Lithium ion
7:00, 2:30	5:00 2:00	3:30, 1:20	3:00, 1:30	3:30, 1:30	3:00, 1:30	8:00, 3:00	8:00, 2:30	5:00, 2:00	4:30, 4:00
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
3 years/3 years	1 year/1 year	3 years/3 years	1 year/1 year	1 year/1 year	1 year/1 year	3 years/3 years	3 years/3 years	3 years/3 years	3 years/3 years
N/A	N/A	N/A	N/A	N/A	\$229.00	\$49.95	\$49.95	\$49.95	\$49.95
■	■	■	■	■	■	■	■	■	■

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SUMMARY OF FEATURES

Color Pentium Notebooks

Ends

■ YES ■ NO

Products listed in alphabetical order

	Twinhead Slimnote 875CX	Twinhead Slimnote 890TX	WinBook XP5	ZDS Z-Note MX	ZDS Z-Note GT
Price (tested configuration)	\$4,099 (street)	\$4,995 (street)	\$3,509 (street)	\$3,298 (list)	\$6,198 (list)
System weight/Travel weight (pounds)	7.4, 8.3	7.4, 8.3	6.2, 7.0	6.1, 6.9	7.4, 8.3
Dimensions (HWD, in inches)	2.1 x 11.5 x 8.6	2.1 x 11.5 x 8.6	2.1 x 11.4 x 8.8	2.0 x 11.0 x 8.5	2.3 x 11.8 x 8.8
Motherboard Components					
Processor type and speed	Pentium/75	Pentium/90	Pentium/90	Pentium/75	Pentium/90
Installed/maximum system RAM	16MB, 64MB	16MB, 64MB	16MB, 32MB	16MB, 40MB	16MB, 40MB
Installed external RAM cache and type	256K asynchronous	256K asynchronous	256K asynchronous	256K synchronous	256K asynchronous
Motherboard manufacturer	Twinhead	Twinhead	ASE	ZDS/Compel	ZDS/Chicony
Chip set manufacturer and model	SiS 550X	SiS 550X	ACC Micro 2056	VLSI Wildcat 594	OPTi Viper 558N
BIOS manufacturer and version (or date)	Phoenix (8/18/95)	Phoenix 4.04	Phoenix 1.03	ZDS/Phoenix 4.0	ZDS/Phoenix 1.02
Flash BIOS/Plug and Play BIOS	■ ■	■ ■	■ ■	■ ■	■ ■
Display					
LCD-panel specifications	10.4" dual-scan SVGA	10.4" active-matrix SVGA	10.4" active-matrix VGA	10.4" dual-scan VGA	11.3" active-matrix SVGA
Graphics chip set manufacturer and model	Cirrus CL-GD7543	Cirrus CL-GD7543	C&T 85535	C&T 65545	C&T 65548
Graphics RAM and type	1MB VRAM	1MB VRAM	1MB DRAM	1MB DRAM	1MB DRAM
Resolutions and noninterlaced refresh rates supported on external display	800 x 600 at 60 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 75 Hz	800 x 600 at 60 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 72 Hz, 1,024 x 768 at 60 Hz	800 x 600 at 72 Hz, 1,024 x 768 at 72 Hz
Simultaneous external display	■	■	■	■	■
Virtual desktop	■	■	■	■	■
Mass Storage					
Hard disk manufacturer and model	Toshiba MK2720FC	Toshiba MK2720FC	Toshiba MK1926FCV	Toshiba MK1926FCV	Toshiba MK2720FC
Installed/maximum hard disk capacity	1.3GB, 1.3GB	1.3GB, 1.3GB	776MB, 1.3GB	777MB, 810MB	1.3GB, 1.3GB
Floppy disk drive	Swappable	Swappable	Internal	Swappable	Swappable
Multimedia Features					
CD-ROM manufacturer and model	Toshiba XM-1102BK	Toshiba XM-1102BK	None	None	TEAC CD-40E
CD-ROM speed and interface	2X ATAPI	2X ATAPI	None	None	2X ATAPI
Sound synthesis	FM	FM	FM	FM	FM
Built-in speakers	■ ■	■ ■	■ ■	■ ■	■ ■
Line-in/line-out jacks	■ ■	■ ■	■ ■	■ ■	■ ■
Microphone/speaker jacks	■ ■	■ ■	■ ■	■ ■	■ ■
NTSC video in/out	■ ■	■ ■	■ ■	■ ■	■ ■
Communications and Expansion					
Modem installed/infrared interface	■ ■	■ ■	■ ■	■ ■	■ ■
Serial/parallel/VGA ports	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
External keyboard and mouse ports	Shared port	Shared port	Keyboard only	Shared port	Shared port
16550 UART/ECP/EPP support	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
PC Card slots	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	One Type II/III and one Type II
Input Devices					
Full-size alphanumeric/cursor keys	■ ■	■ ■	■ ■	■ ■	■ ■
Type of integrated pointing device	Touch pad	Touch pad	Pointing stick, trackball	Touch pad	Pointing stick
Power					
Battery type	Lithium ion	Lithium ion	Lithium ion	Nickel hydride	Lithium ion
Rated charge time while on/off (hours:minutes)	9:00, 2:00	9:00, 2:00	5:00, 3:00	3:00, 1:30	3:00, 2:00
Standby/hibernation mode	■ ■	■ ■	■ ■	■ ■	■ ■
Battery hot-swapping/Smart battery	■ ■	■ ■	■ ■	■ ■	■ ■
Service and Support					
Standard warranty on parts/labor	1 year/1 year	1 year/1 year	1 year/1 year	1 year/1 year	3 years/3 years
On-site service charge (first year)	N/A	N/A	N/A	Included	Included
24-hour, 7-day live technical support	■	■	■	■	■

N/A—Not applicable: The product does not have this feature.

pack costs \$99.

The notebook came with Microsoft Windows 95 Briefcase installed but not with Direct Cable Connect. The company backs this notebook with a one-year parts-and-labor warranty; on-site service is not available.—BB

X-751C Yesbook. Estimated street price: \$2,595. MaxTech Corp., Rockaway, NJ; 800-936-7629, 201-586-3008; fax, 201-586-3308.

Circle 468 on reader service card

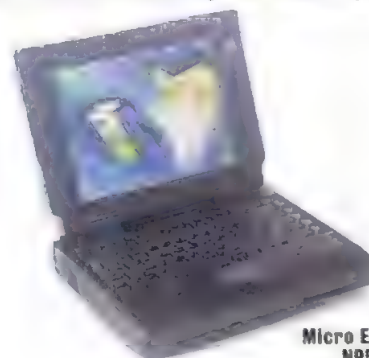
Micro Express

Micro Express NP52P100

The Pentium/100-based Micro Express NP52P100, manufactured by Full Power Investment Co. of Taiwan, is positioned as a competitively priced multimedia notebook for business users and is specifically targeted at users of sales and presentation applications. The 9.3-pound notebook (equipped for travel with a 28.8/14.4-Kbps PC Card data/fax modem) carries a street price of \$4,449 with a 10.4-inch active-matrix display and an internal double-speed CD-ROM drive. (The same system with a dual-scan display is \$3,699.)

The Micro Express—equipped with 256K of asynchronous L2 cache and a 776MB hard disk—was the fastest of the four Pentium/100 units tested. Its Windows-based benchmark test scores were all comparable to those of midrange 120-MHz machines.

During video testing, the NP52P100 performed similarly to other systems



Micro Express
NP52P100.

SUITABILITY TO TASK

X-751C Yesbook

Desktop replacement	Fair
Road warrior	Good

SUITABILITY TO TASK

Micro Express NP52P100

Desktop replacement	Good
Road warrior	Good

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SONY

with double-speed CD-ROM drives: It dropped lots of frames with full-screen-scaled video clips. Battery life, however, is not a strong point: The unit, outfitted with a nickel hydride battery, lasted only 52 minutes on our WinDrain test.

Audio support for both FM and wavetable sound is provided, with volume controlled by the keyboard. Neither Windows 95 Briefcase nor Direct Cable Connection was installed, an oversight for a portable system.

Micro Express provides a two-year parts-and-labor warranty for the NP52P100 and toll-free technical support during weekday business hours.—BB

Micro Express NP52P100. *Estimated street price: \$4,449. Micro Express, Santa Ana, CA; 800-989-9900, 714-852-1400; fax, 714-852-1225.*

Circle 469 on reader service card

MidWest Micro

Sound Book Plus P5-90

The Sound Book Plus P5-90 (\$3,499 street), from MidWest Micro, is aimed at power users. With its solidly average performance and bright, 10.4-inch active-matrix display, the unit should serve them well.

This Pentium/90-based unit's 8-pound travel weight makes it easy to take on the

SUITABILITY TO TASK

Sound Book Plus P5-90

Desktop replacement	Good
Road warrior	Good

SERVICE & RELIABILITY

MidWest Micro

Reliability	Average
Repair	Average
Technical support	Worse than average
% needing repair	Worse than average

road. Don't plan on working long between charges, however: Using its nickel hydride battery, the systems lasted only 1 hour 16 minutes on our WinDrain battery test. Moreover, the notebook does not support a second nickel hydride battery.

As its name implies, the Sound Book Plus features 16-bit FM-synthesis-capable integrated audio, supported by two speakers built into an expansive wrist rest below the keyboard. Volume is controlled through function keys.

The 688MB hard disk is removable, although with some difficulty. Memory upgrades are also tricky: To access memory,

Sound Book Plus P5-90.

you have to unscrew both a cover on the notebook's underside and a metal plate that serves as a heat sink for the PGA-packaged processor.

The Sound Book Plus, helped by its 256K of asynchronous external processor cache, did well on our benchmark tests. The unit posted average Winstone 96, Disk WinMark 96, and Graphics WinMark 96 scores in its CPU group.

MidWest Micro offers a three-year warranty on parts and labor with this notebook. On-site service, however, is not available.—WPF

Sound Book Plus P5-90. *Estimated street price: \$3,499. MidWest Micro, Fletcher, OH; 800-871-9127, 513-368-2309; fax, 800-562-6622; Web, <http://www.mwmicro.com>.*

Circle 470 on reader service card

MPC Technologies Inc.

CD-Note 900P

According to MPC Technologies, the Pentium/90-based CD-Note 900P (\$3,789 street) is for the road warrior who needs a CD-ROM drive. With poor performance and a rather hefty travel weight of 9.4 pounds, however, you may hesitate before taking the modular CD-Note 900P on the road. This system is manufactured by Dual Technology Corp.



CD-Note 900P.

of Taiwan and is also sold by ARM (as the Arm TS50CD), CHEM (as the ChemBook 5550), and FutureTech (as the FutureMate 5513D). These notebooks are all reviewed in this roundup.

The CD-Note 900P does have a number of attractive features. The 10.3-inch active-matrix display can be turned to face the opposite way for presentations. The CD-Note 900P also incorporates 16-bit FM-synthesis audio support with an integrated microphone, line-in and headphone jacks, and a thumbwheel volume control.

The CD-Note 900P has removable components that can be combined in various configurations. The socket on the left holds either the CD-ROM drive or the battery; the socket on the right holds the floppy disk drive or the battery. The 1.3GB hard disk is removable but not interchangeable. On our WinDrain battery test, the unit posted a mediocre 1 hour 7 minutes, which can be increased by adding a second 1.1-pound battery.

MPC added 256K of L2 cache to the system, but the unit's scores on our Windows-based benchmark tests were well below the average of all other Pentium notebooks in this review.

MPC Technologies includes a one-year parts-and-labor warranty. No on-site service is included.—WPF

CD-Note 900P. *Estimated street price: \$3,789. MPC Technologies Inc., Santa Ana, CA; 800-672-8088, 714-724-9000; fax, 714-724-9648; e-mail, help@mpctech.com.*

Circle 471 on reader service card

NEC Technologies Inc.

NEC Versa 4050C

NEC Technologies, which also sells the Versa 2000 line of entry-level notebooks, markets the 90-MHz Pentium-powered Versa 4050C (\$5,723 street) as a notebook for both the road warrior and the power user. This machine was an average performer on our benchmark tests.

The Versa 4050C, at a travel weight of 7.9 pounds, supplies a 10.1-inch active-matrix Super VGA display and an NEC

SUITABILITY TO TASK

CD-Note 900P

Desktop replacement	Good
Road warrior	Fair



NEC Versa 4050C.

VersaGlide touch pad. There are two built-in infrared ports (one in the front and one in the back) and one Type III or two Type II PC Card slots. Audio support is limited, unfortunately, to 8-bit FM synthesis. Other features include two speakers integrated on either side of the display panel, jacks for headphones and a microphone,

SUITABILITY TO TASK

NEC Versa 4050C

Desktop replacement	Good
Road warrior	Good

SERVICE & RELIABILITY

NEC Technologies

Reliability	Better than average
Repair	Average
Technical support	Average
% needing repair	Better than average

and a volume-control thumbwheel. The Versa 4050C has a removable floppy disk drive that can be swapped with a second lithium ion battery. The 777MB hard disk is also removable, giving the user access to upgrade the system's memory. The CD-ROM drive is internal.

Using a lithium ion battery pack, the Versa 4050C managed a respectable 1 hour 31 minutes on our WinDrain battery test. This Pentium/90 notebook comes loaded with 256K of synchronous external processor cache. Its Disk WinMark 96, Winstone 96, and Graphics WinMark 96 scores were all average compared with the other 90-MHz Pentiums in this roundup.

NEC provides a three-year parts-and-labor warranty with the package. If you register your notebook, the warranty includes one year of 24-hour replacement service, with free overnight pickup and delivery.—WPF

NEC Versa 4050C. Estimated street price: \$5,723. NEC Technologies Inc., Boxborough, MA; 800-632-8377, 508-264-8000; fax, 508-635-4666; Web, <http://www.nec.com>.

Circle 472 on reader service card

Polywell Computers Inc.

Poly 500NBS

Targeted at high-end power users, the Poly 500NBS, from direct marketer Polywell Computers, is one of only four 100-MHz Pentium portables in this roundup. This notebook is well priced at \$3,745 (street), but its performance was more on a par with the 90-MHz Pentium entries. Polywell reentered the notebook market six months ago after a long hiatus. Its notebooks are manufactured by Prima.

The Poly 500NBS came with a removable 1.3GB hard disk. The system uses two nickel hydride batteries (they cannot be used separately) that together posted a disappointing 1-hour-15-minute WinDrain time.

The Poly 500NBS features a 10-inch active-matrix screen as well as 256K of asynchronous external processor cache. The



Poly 500NBS.

unit's PC Card socket supports one Type III card or two Type II cards. The Poly 500NBS has a travel weight of 8.3 pounds.

Our benchmark tests showed the 100-MHz Poly 500NBS to be on a par with the majority of the 90-MHz Pentiums we tested. The unit, however, was bested by a number of the 90-MHz systems on the Winstone 96, Disk WinMark 96, and Graphics WinMark 96 tests.

A \$495 docking station is available with this portable system. Polywell provides a one-year parts-and-labor warranty with the Poly 500NBS. On-site service is not available.—WPF

Poly 500NBS. Estimated street price: \$3,745. Polywell Computers Inc., South San Francisco, CA; 800-999-1278, 415-583-7222; Web, <http://www.polywell.com>.

Circle 473 on reader service card

Sceptre Technologies Inc.

SoundX Gold Series

The SoundX Gold Series, from Sceptre Technologies, offers solid performance and features at a very competitive street price of \$3,450 (\$3,995 list). Sceptre Technologies targets corporate travelers with this Pentium/75 notebook.

The unit's 517MB hard disk may limit some users in terms of storage, but Sceptre Technologies also ships the system with an 810MB disk (a \$150 upgrade). The SoundX Gold's 7.1-pound travel weight makes it attractive for road warriors, as does the fact that you can substitute a second nickel hydride battery for the floppy disk drive. The latter feature is crucial, because the unit's WinDrain time with one battery was only 1:16.

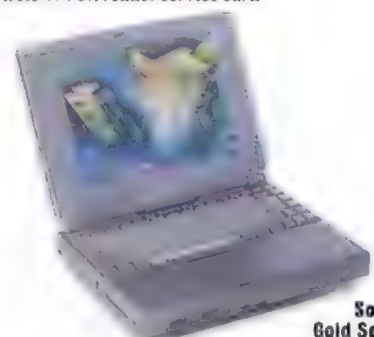
The SoundX Gold has 16-bit FM and wavetable-synthesis audio support, and it includes a microphone and speakers as well as a separate port for external versions of each. The system also features a 10.4-inch dual-scan display.

The unit proved to be a strong performer in its 75-MHz Pentium group. The SoundX Gold achieved the top Winstone 96 and Graphics WinMark 96 scores in its class; its Disk WinMark 96 score was also good. This performance can be partially attributed to the inclusion of 256K of external processor cache.

This notebook comes with a three-year parts-and-labor warranty; no on-site service is available.—WPF

SoundX Gold Series. Estimated street price: \$3,450. Sceptre Technologies Inc., City of Industry, CA; 800-788-2878, 818-369-3698; fax, 818-369-3488.

Circle 474 on reader service card



SoundX Gold Series.



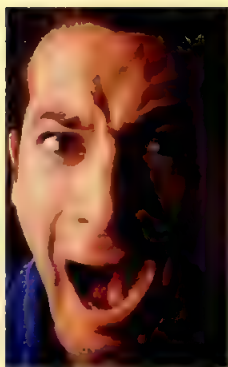
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Sharp Electronics Corp.

Sharp PC-3060

Sharp Electronics Corp. sells the Sharp PC-3060 for \$3,098, positioning it as a color notebook for value-conscious corporate buyers and consumers. Based on a 100-MHz Cyrix CX5x86-100 CPU, this 7.1-pound (travel weight) unit features a 10.1-inch dual-scan color display and a 14.4-Kbps voice/fax modem. Although the PC-3060 is well integrated with software and hardware, it is hindered by poor benchmark test performance, lack of L2 cache, and a relatively small 504MB hard disk.

The PC-3060 has a GlidePoint touchpad in the center of its wrist-rest area. The audio system supports both FM-synthesis and wavetable sound, and it has microphone, line-in, and speaker-out jacks located



Sharp PC-3060.

on the center front of the computer. An IrDA-compliant infrared port is located on the back of the unit and can work with included software to communicate with PDAs and peripheral devices.

The unit's Winstone 96 and Disk WinMark 96 scores were better than those of the HyperData Media Go CD-Note, a 120-MHz Cyrix notebook, but worse than those of almost all Pentium units. Its Graphics WinMark 96 score was also low, in this case lower than that of the HyperData system. On our WinDrain battery test, the unit, using a nickel hydride battery, lasted 1 hour 34 minutes.

The system comes with CheckFree for Windows, Dow Jones Personal Journal, MindPath Presentation F/X, Puma's TranXit, and Pacific Image Communications' SuperVoice. The PC-3060 has a one-year warranty that includes Sharp-

Fast, a next-day exchange-and-repair service. Sharp Electronics also offers 24-hour, 7-day technical support.—*BB*

Sharp PC-3060. List price: \$3,098. Sharp Electronics Corp., Mahwah, NJ; 800-237-4277, 201-529-8200; fax, 201-529-9113.

Circle 475 on reader service card

Swan Technologies Corp.

SwanNotePlus P75

Swan Technologies Corp. markets the Pentium/75-powered SwanNotePlus P75 as a road warrior system, and for the most part, it fills the bill. It was an average performer for its class, with a travel weight of only 6.7 pounds, an attractive combination at \$2,978 (street price).

The notebook we tested had a 777MB hard disk as well as a 10.4-inch dual-scan display. Other features include 16-bit FM-synthesis-capable audio support, an easy-to-use touch pad, and an infrared port. Memory upgrades are facilitated by a removable door on the underside of the system; this operation was well documented in the manuals.

The SwanNotePlus's hard disk is not removable, although the floppy disk drive is. The space created by the floppy disk drive module can be used by a second nickel hydride battery. You will probably need the second battery, because with a single battery, the SwanNotePlus posted a disappointing 1 hour 1 minute on our WinDrain battery test.

The SwanNotePlus came with 256K of external processor cache. This notebook posted a Disk WinMark 96 score that was average compared with the other 75-MHz Pentium entries. Graphics WinMark 96 and Winstone 96 scores were



SwanNotePlus P75.

also average for this CPU class.

Swan backs the SwanNotePlus with a one-year parts-and-labor warranty. On-site service is not available.—*WPF*

SwanNotePlus P75. Estimated street price: \$2,978. Swan Technologies Corp., Marlborough, MA; 800-446-2502, 508-460-1977; fax, 508-480-0156; Web, <http://www.swantech.com>.

Circle 476 on reader service card

Texas Instruments

TI Extensa 550CDT

Texas Instruments' 75-MHz TI Extensa 550CDT comes equipped with all you'll need for computing on the road, including a double-speed CD-ROM drive. A mostly average performer on our tests, the Extensa is attractively priced at \$4,198 (street price). The Extensa value line of portables is marketed to Fortune 500 companies and home-office buyers. TI also sells the TravelMate 5000 line of high-end Pentium notebooks.

The Sharp 10.4-inch active-matrix screen is crisp and well saturated; the brightness and contrast are keyboard-controlled. The CD-ROM drive is removable and can be replaced with a 3.5-inch floppy disk drive. The unit also features 16-bit audio, which supports both FM and wavetable synthesis.

Equipped for the road, the Extensa weighs in at 8.5 pounds. The system also features two Type II (or one Type III) PC Card slots and an infrared port.

The unit did not do well on our multimedia tests. Its double-speed CD-ROM drive could not keep up with quad-speed units, so the system produced a below-average CD-ROM WinMark 96 score. It also had a significant number of frame drops both on our video tests and in subjective observation.

The Extensa's 75-MHz Pentium CPU is backed by 256K of L2 cache. Equipped with a 500MB hard disk, the unit garnered a below-average Disk WinMark 96 score. Its Graphics WinMark 96 and Winstone

SUITABILITY TO TASK

Sharp PC-3060

Desktop replacement	Good
Road warrior	Good

SUITABILITY TO TASK

SwanNotePlus P75

Desktop replacement	Good
Road warrior	Good

SUITABILITY TO TASK

TI Extensa 550CDT

Desktop replacement	Fair
Road warrior	Fair

SERVICE & RELIABILITY

Texas Instruments

Reliability	Average
Repair	Average
Technical support	Average
% needing repair	Average



TI Extensa 550CDT.

96 scores were both average. The Extensa's nickel hydride battery lasted 1 hour 25 minutes on our WinDrain test.

The Extensa comes with Entertainment Pack 4, Lotus Organizer, MS Works, and Quicken. A port replicator is available for \$129. Texas Instruments offers a one-year warranty with the unit. On-site service is available for an additional \$229.—MEB

TI Extensa 550CDT. Estimated street price: \$4,198. Texas Instruments, Dallas, TX; 800-848-3927, 817-771-5856; fax, 817-774-6660.

Circle 477 on reader service card

Toshiba America Information Systems Inc.

Portégé 610CT, Satellite Pro 400CDT, Satellite Pro 410CDT, Tecra 700CT



Toshiba's four entries in this roundup offer something for all types of road warriors. The 5.5-pound, 90-MHz Portégé 610CT (\$4,678), an Editors' Choice recipient, is for people who want performance in a small package. Our second Editors' Choice, the 75-MHz Satellite Pro 400CDT (\$4,678), comes with a 10.4-inch display and internal quad-speed CD-ROM drive. It's an entry-level desktop replacement targeted for sales-force automation and presentations. The Satellite Pro 410CDT (\$5,378) is a step up to a 90-MHz CPU and 11.3-inch SVGA screen; it's for traveling multimedia users who want better performance. Toshiba's top-of-the-line desktop replacement, the Tecra 700CT, with a 120-MHz CPU and 11.3-inch SVGA display, sells for \$5,999. It has an optional quad-speed CD-ROM drive and is intended for

both multimedia-application creators and corporate and professional users who need top performance. (All prices above are list prices.)

All of the Toshiba models come with lithium ion batteries and AccuPoint pointing sticks. None have L2 cache, but all except the Tecra use EDO DRAM; the Tecra uses synchronous DRAM.

The 5.5 pound Portégé uses an external floppy disk drive. The unit has a 687MB hard disk and 16-bit FM audio. The Portégé, though the smallest notebook tested, was one of the top-performing 90-MHz units, with the second-best Winstone 96 score, an average Graphics WinMark 96 score, and third-best Disk WinMark 96 score. Its 2-hour-51-minute tested battery life was the second-best of all notebooks reviewed.

The 75-MHz Satellite Pro 400CDT has a travel weight of 7.6 pounds, a 776MB hard disk, an internal quad-speed CD-ROM drive, and an internal AC adapter (you need to carry only a cord). It had the second-best Winstone and Disk WinMark scores, and an average Graphics WinMark score for its CPU group. Battery life was terrific at 2 hours 10 minutes, as was video clip performance, thanks to the quad-speed CD-ROM drive. But the 400CDT did drop more frames on the full-screen test than the 410CDT; the latter benefited from its faster CPU as well as its C&T 65548 chip set.

The Satellite Pro 410CDT has the same travel weight, hard disk, and CD-ROM drive as the 400CDT but comes with a 90-

SUITABILITY TO TASK		SUITABILITY TO TASK	
Portégé 610CT		Satellite Pro 400CDT	
Desktop replacement	Poor	Desktop replacement	Good
Road warrior	Excellent	Road warrior	Good

SUITABILITY TO TASK		SUITABILITY TO TASK	
Satellite Pro 410CDT		Tecra 700CT	
Desktop replacement	Excellent	Desktop replacement	Excellent
Road warrior	Good	Road warrior	Excellent



Tecra 700CT.

MHz CPU and an 11.3-inch screen that supports 800-by-600 resolution. The 410CDT had average scores on all Windows-based tests and a 1:45 battery life. It did very well in video clip testing, with significant frame drops only in the full-screen scaled sample.

Toshiba's flagship portable, the 120-MHz Tecra 700CT, features an 11.3-inch SVGA screen, external PCI support for the optional \$780 docking station, a C-cell-size lithium ion battery, and a 1.1GB hard disk. The 9-pound (travel weight) unit also has FM and wavetable 16-bit audio with stereo speakers.

The Tecra 700CT's battery lasted an impressive 2:31 on our WinDrain test. In conventional performance testing, the Tecra 700CT posted average Winstone and Graphics WinMark scores and the second-best Disk WinMark score in its CPU class. The Tecra 700CT did very well in full-screen video testing, with no frame dropping with high-transfer-rate samples.

Toshiba backs these portables with 24-hour, 7-day toll-free technical support and a three-year warranty. On-site service costs an additional \$49.95 per year.—BB
Portégé 610CT. List price: \$4,678. **Satellite Pro 400CDT.** List price: \$4,678. **Satellite Pro 410CDT.** List price: \$5,378. **Tecra 700CT.** List price: \$5,999. Toshiba America Information Systems Inc., Irvine, CA; 800-999-4273, 714-583-3000; Web, <http://www.toshiba.com/tais/csd/products>.

Circle 478 on reader service card

Twinhead Corp.

Slimnote 875CX, Slimnote 890TX

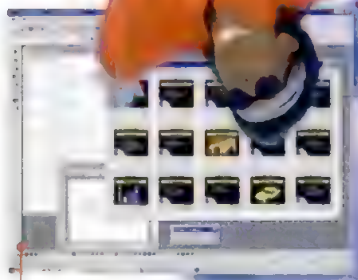
The Slimnote 890TX (\$4,995 street) should satisfy power users: It had the best Winstone 96 score of its 90-MHz class. Twinhead's other entry, the Slimnote 875CX (\$4,099 street), was a mostly

COREL DRAW!™ 6

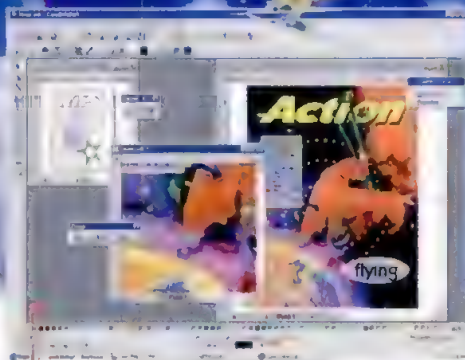
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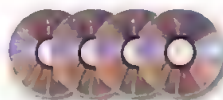
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average performer for a 75-MHz system. Both units are aimed at corporate users seeking desktop replacements.

These notebooks are identical, with the exception of the CPU and the

Slimnote 890TX. Estimated street price: \$4,995. **Slimnote 875CX.** Street price: \$4,099. Twinhead Corp., Milpitas, CA; 800-995-8946, 408-945-0808; fax, 408-945-1080.

Circle 479 on reader service card

WinBook Computer Corp.

WinBook XP5

The line to purchase WinBook Computer Corp.'s 90-MHz Pentium WinBook XP5 is likely to be a long one. Good performance, a 10.4-inch active-matrix display, 256K of external processor cache, a lithium ion battery, a 776MB hard disk, and an internal 14.4-Kbps fax

*Both of Twinhead's
Slimnote portables
are multimedia-
ready, with CD-ROM
drives and MPEG
support.*

modem make the XP5 a great value for \$3,509 (street price). The company aims the unit at a broad range of users, from small/home-office buyers to those seeking desktop replacements.

One thing you don't get with the XP5 is an internal CD-ROM drive, but you can buy the optional \$399 docking station with two drive bays, two ISA expansion slots, duplicate ports, and a quad-speed CD-ROM drive. Internal FM-synthesis audio with external

jacks and volume control is a \$79.95 option (included in the price cited above).

The WinBook XP5 weighed in at 7 pounds equipped for the road. The ample wrist rest has an optional trackball in the center (\$29.95, included above) in addition to a pointing stick in the middle of the keyboard; both are active simultaneously.

Compared with other 90-MHz notebooks, the WinBook posted an average



WinBook XP5.

Winstone 96 score, one of the best Graphics WinMark 96 scores for its class, and an average Disk WinMark 96 score. The unit, using a lithium ion battery, ran for 2:15 on our WinDrain test.

Mindful of mobile users, WinBook Computer Corp. installed both Briefcase and Direct Cable Connection. The XP5 is sold with a one-year warranty; an additional two years costs \$299. No on-site service is available.—BB

WinBook XP5. Estimated street price: \$3,509. WinBook Computer Corp., Columbus, OH; 800-468-2162; fax, 800-448-0308.

Circle 480 on reader service card

Zenith Data Systems

Z-Note MX, Z-Note GT

Zenith Data Systems' two notebooks—the \$6,198, 90-MHz Z-Note GT and \$3,298, 75-MHz Z-Note MX (list prices)—offer appropriate levels of performance for their target markets. The Z-Note GT, with its 11.3-inch active-matrix SVGA display, 1.3GB hard disk, double-speed CD-ROM drive, and Sound Blaster Pro audio, is aimed at those needing a high-performance multimedia notebook. The Z-Note MX, which has a 777MB hard disk and a 10.4-

SERVICE & RELIABILITY

Zenith Data Systems

Reliability	Worse than average
Repair	Worse than average
Technical support	Worse than average
% needing repair	Average

SUITABILITY TO TASK

Z-Note MX

Desktop replacement	Good
Road warrior	Good

SUITABILITY TO TASK

Z-Note GT

Desktop replacement	Good
Road warrior	Good



Slimnote 890TX.



Z-Note GT.

inch dual-scan display and is Sound Blaster-compatible, is a midrange unit for mainstream users in sales and marketing.

The 8.3-pound (travel weight) Z-Note GT had an above-average Graphics WinMark 96 score, and average Winstone 96 and Disk WinMark 96 scores for its class. The unit ran for 1 hour 21 minutes with a lithium ion battery on our WinDrain test. Equipped with C&T's 65548 graphics chip set, the unit did extremely well with full-scale clips. A \$199 quad-speed CD-ROM drive and \$399 MPEG-1 are optional. You can substitute a CD-ROM drive, a second battery, or a second hard disk for the floppy disk drive module.

The Z-Note MX was an average performer for its class on all tests, but it lasted only 1:15 on the WinDrain test with its nickel hydride battery. The 6.9-pound (travel weight) unit's external AC adapter can replace the removable floppy disk drive to minimize travel bulk. The Z-Note MX also includes two speakers and a microphone, a touch pad, and rear fold-down feet for tilting the unit to a comfortable typing angle.

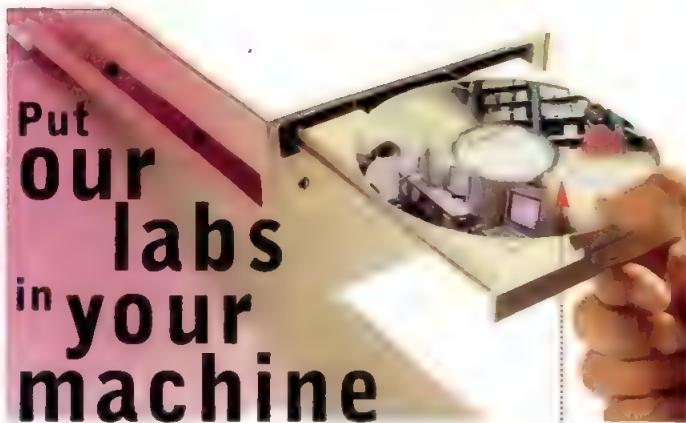
Both ZDS notebooks were bundled with Netscape Navigator Personal Edition, Norton Navigator, Norton Anti-Virus, and CoSession Remote. The GT model adds OAG Flightdisk, MindPath Presentation FX, and the SoftKey Multimedia Library. The Z-Note GT has a three-year warranty, with the first year of on-site service included. The Z-Note MX packs a one-year warranty, including on-site service.—BB □

Z-Note MX. List price: \$3,298. **Z-Note GT.** List price: \$6,198. Zenith Data Systems, Buffalo Grove, IL; 800-533-0331, 708-808-5000; fax, 708-808-4434; Web, <http://www.zds.com>.

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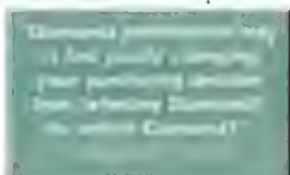
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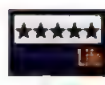
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CIRCLE 101 ON READER SERVICE CARD



CD-ROM DRIVES

The Third Generation

Double-speed is dead, but quad-speed lives on.
So how much extra oomph does a 6X drive deliver?

The CD-ROM drive, once a power user's toy, is now a standard component of any fully configured PC. And with more powerful computers and feature-rich operating systems, users at all levels are expecting their CD-ROM drives to do more than merely play games. Today's drives must play music, deliver large databases across networks, serve up video clips and business presentations, and even handle full-length movies. The technology is better than ever: Drives are faster, prices are lower, and enhancements abound.

CD-ROM technology is a rapidly changing segment of the

PC market, notorious for making drives obsolete before the warranty even expires. The first wave of drives to penetrate the mainstream PC market was double-

speed drives. The nominal speed of a drive refers to its effective transfer rate. Single-speed drives, which appeared first and are still the standard in audio CD players, transfer data at 150 kilobytes per second (KBps). When drives came to market boasting a 300-KBps transfer rate, they were dubbed "double-speed," and so on.

Triple-speed drives were barely off the boats when quadruple-speed drives ap-

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By James Karney

HIGHLIGHTS

CD-ROM Drives

CD-ROM technology has made having the world at your fingertips a waking reality. At a moment's notice you can zoom off to the Art Institute of Chicago and lose yourself among the Stellas and Picassos. Stroll across the Golden Gate Bridge on your lunch break. And why not take a trip around the world while you're at it? Villains and androids are more realistic than ever. The new 6X CD-ROM drives want to prove it to you.

REMEMBER WAY BACK when double-speed drives seemed sufficient, if not a luxury? The market quickly moved to quad-speed as the standard, and is poised to leap forward again. But do you need the extra speed of a 6X or 8X unit, or is there still life in that quad speed yet?

WE FOUND that while the speed increase does indeed deliver a marginal performance advantage for chores such as installing software from CD-ROM or executing database searches, most typical users won't find a 6X drive improves their lives dramatically. As to video playback, a 4X drive can handle the current video standard delivered by today's multimedia apps.

WE SAID TODAY'S APPS. If you're tempted by the shelf-clearing prices of the quad-speed drives, consider that while they handled present titles well, more demanding multimedia files likely to be standard in the coming years were choppy in playback. To protect your investment, you may want to opt for a 6X now.

peared. And now quadruple speed, the darling of the business in 1995, is looking over its shoulder. The major drive vendors are focusing on 4.4X, 6X, and even 8X units. With transfer rates ranging from 650 KBps to 1,200 KBps, these units improve performance for many data-intensive chores.

REVIEW CRITERIA

The ultimate question, though, is: Are 4.4X, 6X, and 8X drives worth the cost? With some quad-speed drives now priced below \$200 on the street, some buyers may balk at paying from \$300 to \$700 just to have the latest and fastest. Or if you're spending the money to upgrade, you may want to trade up to a multidisk changer—such as the Pioneer DRM-624X (reviewed in the sidebar “4.4X Drives: A Flash in the Pan Worth Considering”) or NEC's \$279 MultiSpin 4x4 CD-ROM Changer—rather than a 6X drive.

To evaluate the state of the art and determine what benefits potentially await buyers, we obtained nine newly released products for evaluation: three 4.4X units (from Pioneer, Plextor, and Toshiba), five 6X drives (from Creative Labs, NEC, Philips, Plextor, and Toshiba), and one 8X offering (from Diamond Multimedia). These were the units ready in time for our

test deadline. Most major drive makers, including Chinon, LG-Goldstar, Mitsumi, and TEAC, were readying 6X drives as we prepared this story. In addition, Axonix Corp. was showing a late beta version of its portable 6X drive, the ProMedia 6XR.

Our testing included running a comprehensive suite of PC Labs' CD-ROM benchmark tests, which measures basic throughput and also evaluates the drives under real-world multimedia and productivity application environments. Our results show just how promising—and how confusing—this dynamic market segment is. For example, the 4.4X and 6X labels serve only as a rough guide. The Plextor 4PleX Plus is a 4.5X drive, and Toshiba claims its high-speed machine provides 6.7X performance. The elegance of a product's engineering, as well as the platform and operating environment used, can lead to significant variations in performance.

The 6X drives we tested on our HP Vectra P90 with 16MB of RAM produced CD-ROM WinMark 96 scores ranging from a low of 340 KBps to a high of 586 KBps. (The CD-ROM WinMark score is an indicator of overall performance, while Access Time and Sequential-Read Throughput tests isolate specific performance characteristics.) The 8X IDE-

based Diamond drive had the fastest sequential read times (1,200 KBps), but because of a slow access time, it scored well below the 6X units (and even Plextor's 4.5X drive) on most of our tests.

HOW MUCH SPEED DO YOU NEED?

For tasks like software loading and database operations, a good quad-speed or 4.4X drive will work as well as a faster unit. We installed CorelDraw 6.0 from CD using a variety of 4X, 4.4X, and 6X drives. The process took about 8 minutes, and the disparity between the slowest and fastest load times was less than 20 seconds. If you plan to use a CD-ROM only for MPC-2 games, playing an occasional audio track, and running business software, a 4X or 4.4X drive will meet your needs for at least the next year, and save you a couple hundred dollars.

When we look down the road, though, the more intensive multimedia apps that are on the way may cause a typical 4X to drop video frames, which will mean choppy video playback. On our most demanding video playback test, our sample multimedia file appeared choppy on our representative 4X drive but played smoothly on all the faster units. So if you're in the market now, you may want to invest in a 6X rather than a 4X, just to protect your investment.

Granted, you'll pay almost double for the privilege: Prices for the latest 6X drives run from about \$300 for an internal IDE unit with no extras, to more than \$700 for top-of-the-line SCSI external drives bundled with high-end host adapters. We can expect drops in these figures as more 6X and 8X CD-ROM drives appear over the next six months.

THINGS TO CONSIDER

If you are in the market for a new drive, there are a few basics you'll need to know. When shopping for a drive, don't confuse *average access time* with *average seek time*. Many vendors list the seek time—the time it takes the drive's read/write head to move randomly among the tracks on the CD, typically in a one-third stroke displacement—prominently on the box. But a drive's average access time—the time it actually takes to seek out the proper data sector and align the head over it—is a much more meaningful figure.

Our Contributors: JAMES KARNEY is a contributing editor of *PC Magazine*. HOLLY AGUIRRE is a staff editor and DENIS TOM is a technical analyst at *PC Magazine*. JAMIE M. BSALES was the associate editor in charge of this story, and technical director NICK STAM was the project leader.

Plextor Corp. 6PleX

The new crop of high-speed CD-ROM drives offers buyers a mixed bag of features and performance, so you'll want to choose carefully.

For our money, Plextor is the clear winner in this roundup. Both products the company submitted are noteworthy for design quality and performance. Our Editors' Choice goes to the Plextor 6PleX drive. It was far and away the best performer, both for multimedia apps and general business use. Attention to detail, quiet operation, and excellent drivers add value, and the unit delivers plenty of raw speed.

Although we covered the 4.4X drives in a sidebar ("4.4X Drives: A Flash in the Pan Worth Considering"), we ran them



little more than a faster motor and a firmware upgrade. Others claim that 6X drives have long-term viability ("long-term" being a relative concept in the computer business).

If you have a quad-speed drive now, you have the luxury of waiting to see how the 6X-versus-8X tug-of-war pans out before your drive is obsolete. But if you're in the market for a new drive now and are tempted by the low price of quad-speed models, consider carefully what you'll be using your drive for in the coming years.

through the same performance tests as their 6X counterparts. Hence, the \$459 Plextor 4PleX Plus, a 4.5X unit, rates an honorable mention for business apps and general CD-ROM operations. It has the same user comforts, and it outdistanced all but its 6X sibling on our benchmark tests.

Another honorable mention goes to NEC's MultiSpin 6Xe (\$599 list). This wasn't the fastest 6X drive we tested, but NEC's attention to detail—resulting in advantages such as full audio controls, quiet operation, and easy installation—

make it a joy to use.

A third honorable mention goes to Pioneer for its innovative DRM-624X six-disk changer (also discussed in "4.4X Drives"). This drive is a cost-effective way to stack several CD-ROM disks in a single case, using only one SCSI ID. It is only a 4.4-speed unit and takes some time to read the disks when a new cartridge is installed. Even so, with applications spilling onto several disks, the convenience of a mini-jukebox may outweigh what you sacrifice in speed versus a 6X.

Moreover, the drive in the box is only part of the story. It has to connect to the PC, and the type of interface affects both cost and performance. SCSI is still king when it comes to boosting CD-ROM performance in multitasking scenarios, but it commands a premium. Still, for occasional use, an IDE drive will handle the job, though not as quickly.

Some SCSI drives offer an additional inducement that helps to balance gripes about difficult installation. SCAM, which stands for SCSI Configured Auto-Magically (who says standards committees have no sense of humor?), enables devices to configure themselves automatically on a SCSI chain with a compliant host adapter in a Plug and Play environment, avoiding any conflicts. Plextor is already shipping 4.5X and 6X kits that include SCAM-compliant Adaptec 2940 PCI host adapters for use under Windows 95. True to the promises, installation of these SCAM-compliant kits went flawlessly in our testing.

WHAT'S THE SHELF LIFE?

Will a rush of 8X models sound the death knell for 6X drives in a few months? Life span is a nagging industry concern, and the answer is difficult to come by. Many vendors are pushing to release 8X drives as soon as possible. Diamond Multimedia released its 8X drive before Comdex. The design mechanics are not that difficult; in most cases, what makes a drive quicker is

Creative Labs Inc.

Blaster CD 6x

ALL REVIEWS BY JAMES KARNEY

The Creative Labs Blaster CD 6X is aimed at the home market. The \$299.99 bundle contains an internal IDE 6X CD-ROM drive, a custom IDE controller, audio and IDE cables, and drivers, as well as a copy of Grolier's Multimedia Encyclopedia.

This kit gets high marks for ease of use. Based on Philips parts, the caddyless drive has standard audio and volume con-

Quicker Still: d-Time95

By Holly Aguirre and Denis Tom

Could it be time for d-Time95? In the I-want-more world of gaming, the answer is yes. Some players are less than satisfied with the performance of their CD-ROM drives. Images are clunky. Punches don't really land. The bad guy gets the girl.

Ballard Synergy Corp. (800-754-1204) presents d-Time95, an acceleration program. d-Time95 uses your PC's hard disk to cache and prestore data. When you're flying down the CD-ROM highway with d-Time95, though, there's a penalty for speeding. Although \$54.95 doesn't seem too stiff a price, forking over 20MB

of hard disk space may well be.

But it's worth the sacrifice. When we played Johnny Mnemonic with d-Time95, the wait time was reduced and audio breaks were few. Johnny moved with fluidity, and his dialogue matched his lips (though his acting didn't improve). Without d-Time95, scenes were choppy and voices were out of synch.

d-Time95 is compatible with all CD-ROM drives, and can coexist with a compressed drive, but only on the uncompressed partition. It's much cheaper than RAM caching, however. In virtual reality, as in real life, you pick the tune and pay the piper.

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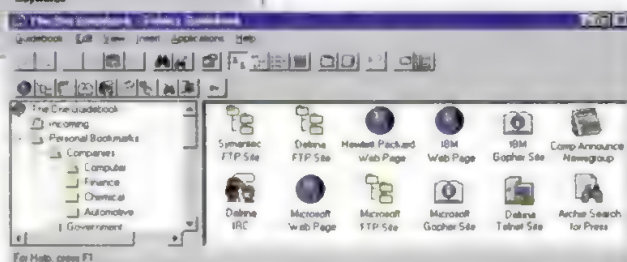
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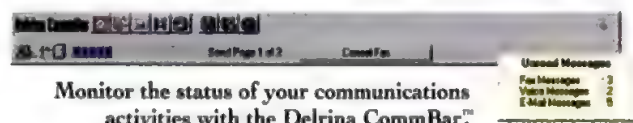


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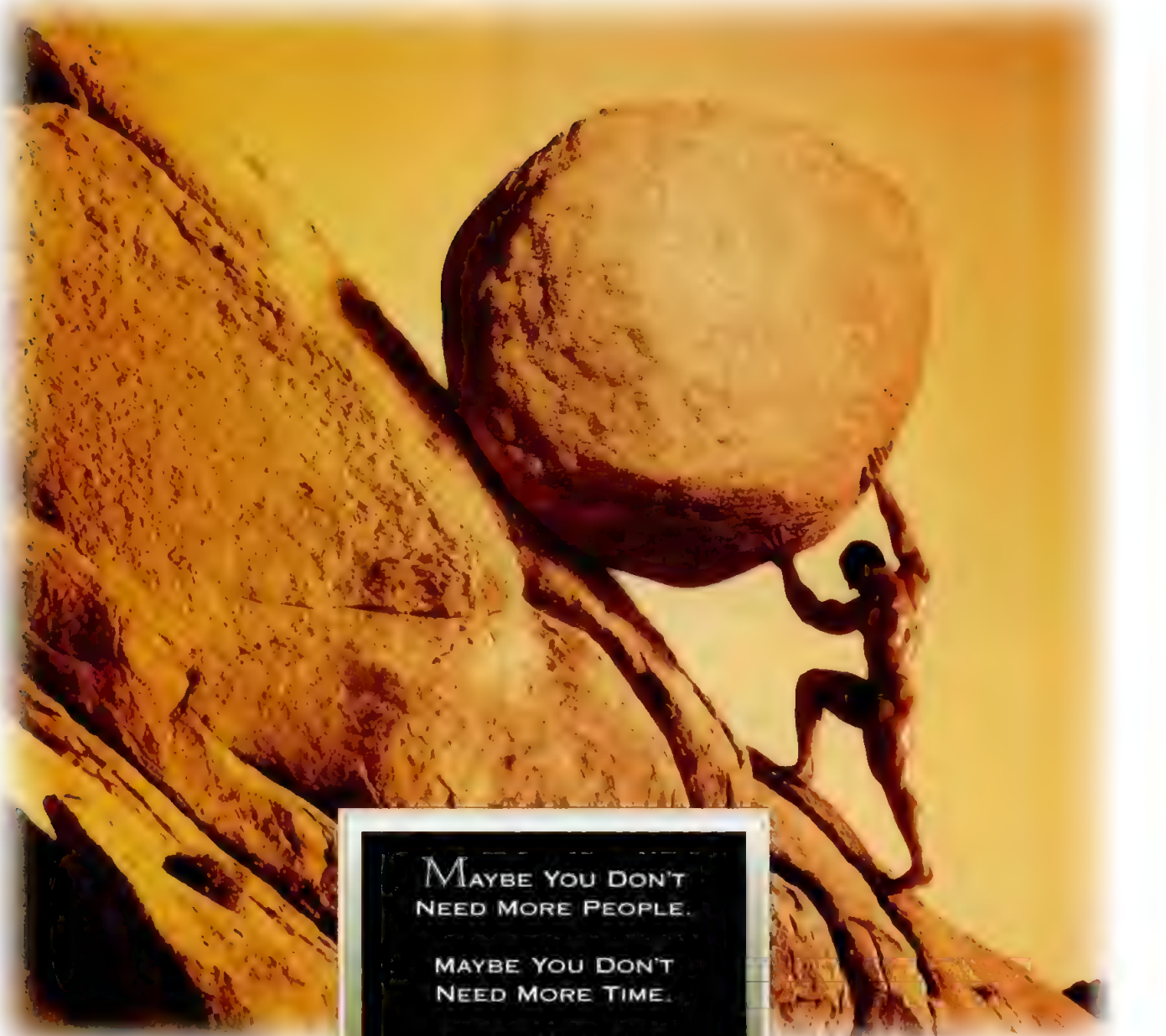
The Cyberjack Guidebook organizes your favorite Internet sites in one place and comes with hundreds of popular sites.



detection built-in. It even lets you download files in the background. All in all, it's the perfect communications solution for Windows 95. And if you can't e-mail Cleopatra, don't despair. These long distance relationships seldom work out anyway.



DELRINA
CIRCLE 316 ON READER SERVICE CARD



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*Ziff-Davis study, PC Computing, November 1994. Kingston Technology Corporation, 17600 Newhope Street, Fountain Valley, CA 92708 USA, (714) 435-2600, Fax (714) 435-2699
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PC MAGAZINE CIRCLE 106 ON READER SERVICE CARD

TECH CORNER

Installing a CD-ROM device is usually manageable under Windows 95 or NT. With matching interfaces for hard disk and CD-ROM, installation can be as easy as setting the SCSI ID or IDE master/slave jumper and attaching the device. Windows 95 has built-in CD-ROM drivers. But our testing uncovered some problems to look out for.

OUR PLUG-AND-PLAY HP Vectra test-bed running Win 95 featured a single IDE interface with two connectors. We had to ensure that the Vectra's on-

board SCSI was disabled both at the BIOS level and at the operating system level before we could install the SCSI cards that came with the reviewed drives. Effectively, we had to release all resources originally assigned to the on-board SCSI channel to avoid conflicts with the new controller.

ANOTHER POTENTIAL problem is in the area of drivers. We used the Creative Labs 32-bit Enhanced drivers with both the Creative Labs and Philips drives. Attached to the Sound Blaster AWE-32 sound card's IDE connector and running under Windows 95, the

drives turned in subpar performance. The problem did not occur under Windows 3.1 with real-mode drivers. Creative Labs reports that it has since fixed the problem, but some early adopters may have had the same trouble we did.

FOR MOST USERS a new CD-ROM drive will be easy to install. But Plug and Play is in its early stages as are Windows 95 and drivers for 6X and 8X drives. Be sure to check out compatibility in advance and keep up-to-date on drivers—and make sure support and return policies are generous.

trols on the front panel so you can listen to audio CDs without loading a CD player applet. Another welcome touch: It's easy to pull out the drawer manually should the power go down and trap a CD inside the drive. The manual contains clear installation instructions and illustrations.

Although we had no problems getting the unit up and running, some concerns did surface later. With the supplied IDE card, DOS-level benchmark tests showed a raw transfer rate in the 950 KBps range, with a seek time of 225 ms—right on target for a 6X drive. Running under Windows 95, however, the drive's performance collapsed. Running the tests again, this time with the drive connected to our testbed's primary IDE channel, we got better—but still not stellar—results: It produced a CD-ROM WinMark 96 score of 340 KBps with a 348-ms access time on our 90-MHz Pentium-based HP Vectra. We traced the problem to the Creative Labs drivers; the company has since fixed the problem and is shipping improved drivers. When we placed the drive in a 133-MHz Micron system (avoiding the interface card and drivers supplied by Creative Labs), the WinMark result climbed to a respectable 477 KBps with a 272-ms access time.

The Blaster CD 6X is a well-constructed drive. With the updated drivers that improve performance under Windows 95, it should be a good value.

Blaster CD 6X. List price: \$299.99. Creative Labs Inc., 1901 McCarthy Blvd., Milpitas, CA 95035; 800-998-5227, 408-428-6600.

Circle 442 on reader service card

Diamond Multimedia Systems Inc.

Diamond Ultra Kit 8000

Diamond Multimedia Systems' new 8X Enhanced IDE CD-ROM drive is aimed solidly at the home market, and is available only with the Ultra Kit 8000 (\$599 list). This bundle includes a Diamond 3D wavetable Plug and Play sound card, Yamaha YST-M5 speakers, and several CD-ROM titles (including

Compton's Interactive Encyclopedia 1996, Myst, and Rebel Assault). Diamond also includes a virtual stereo applet, with all of the controls found on a typical CD player.

The Ultra is composed of Philips parts and assembled to Diamond's specifications, and its raw throughput of 1,200 KBps is impressive. But this is no speed-reader. Its access time of 263 ms was below the average for the 6X drives



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Benchmark Tests: CD-ROM Drives

Although in theory these CD-ROM drives should perform on a par with one another, we found that results varied widely.

What the Numbers Mean

The 4.4X drives surpassed their rated throughput speed of 660 KBps, almost outdoing the 6X Philips drive. The 6X drives scored close to their rated speed of 900 KBps with the exception of the Creative Labs and the 6X Philips drives. Creative Labs' unoptimized Windows 95 drivers caused its 6X drive to score 788 KBps, but when we loaded the 16-bit drivers for Windows 3.11, the drive's throughput improved (Creative Labs is now providing improved drivers). The Toshiba XM-3701, which read up to 960 KBps, actually has a 1,000-KBps rated throughput, making it a 6.7X drive. Diamond's 8X drive scored right on the mark, throughputting 1,200 KBps.

Access times correlated with how well the drives did on our CD-ROM WinMark 96 suite. Plextor's 4PleX Plus had the quickest access time and scored an impressive 526 KBps, out-doing all the 6X drives with the exception of the 6PleX, which had the second-quickest access time. Although Diamond's 8X throughput rate was on the mark, its slow access time also down its WinMark score.

All the drives in the roundup breezed through a 15-frame-per-second video clip at double-speed transfer rates, dropping no frames and having no audio breaks. But when we introduced a 30-fps, 600-KBps video clip, the 6.7X Toshiba drive and its Future Domain controller dropped 12 frames, while Diamond's 8X drive dropped 6 frames with its OPTi controller on the interface card. CPU utilization rose from under 60 percent to above 90 percent for many of the CD-ROM subsystems. We played back an even more demanding 750-KBps video clip for the faster-rated drives and intensified the problems we saw with the 600 KBps video clip. The Diamond and Toshiba drives dropped a major portion of frames, while the Creative Labs and Philips drives held on, dropping only 77 and 86 frames respectively. The Plextor 6X and NEC drives dropped the fewest frames, 0 and 6 respectively.

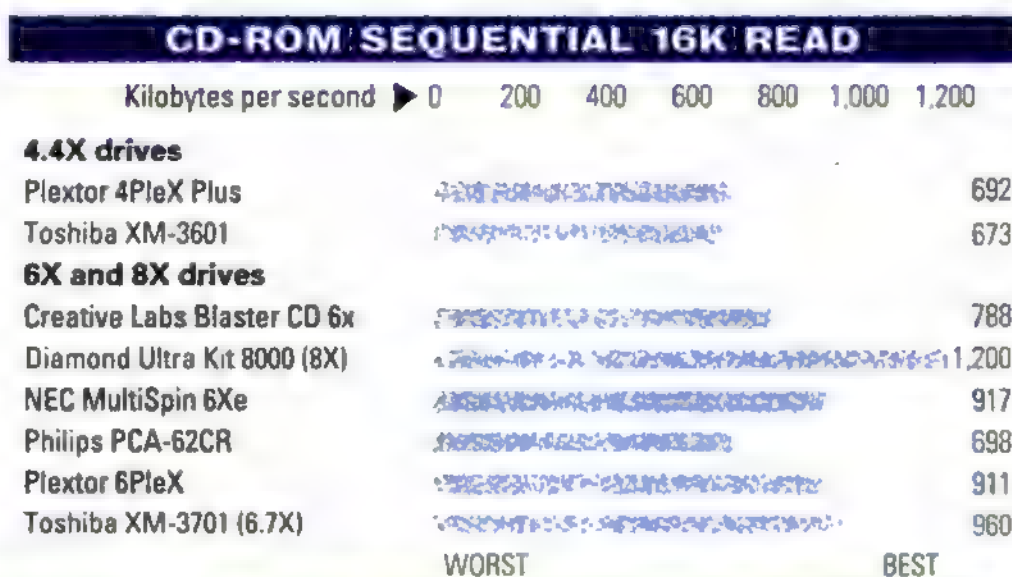
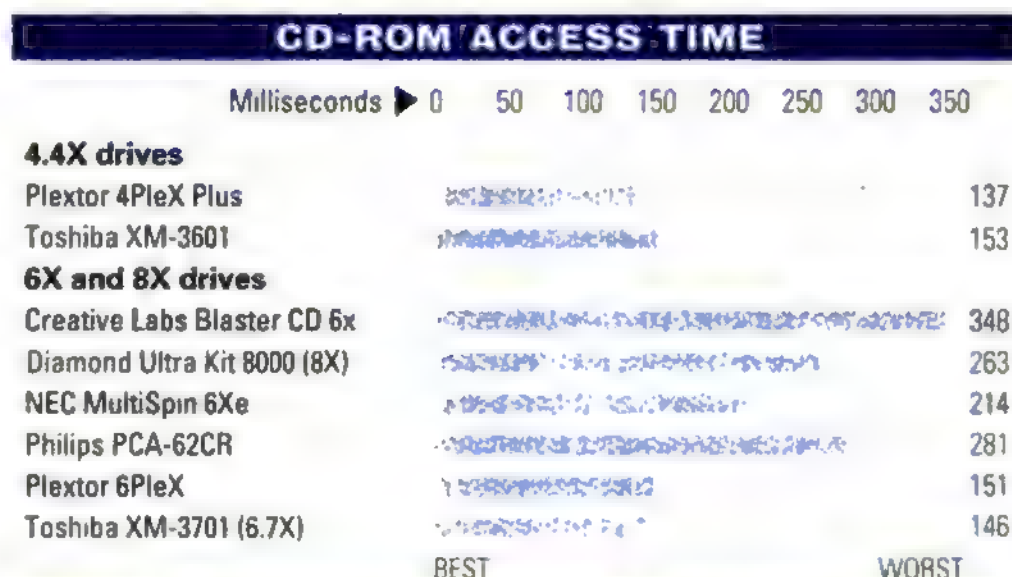
How We Tested

The **Access Time** test measures the time it takes a CD-ROM drive to position its read head over a randomly selected data sector and to read a 2K sector at that location. The average stroke distance is one-third of the entire CD-ROM disk.

The **Sequential-Read Throughput** test measures a drive's raw sequential data throughput rate. Each drive reads our entire test CD in 16K blocks.

The **CD-ROM WinMark 96** test plays back CD-ROM operations from a profile of six of today's most popular Windows CD-ROM applications. WinMark 96 then takes the average transfer rate for each application and uses a weighted harmonic mean to calculate the average transfer rate for your PC's CD-ROM subsystem, in thousands of bytes per second.

We ran all of our CD-ROM benchmark tests with HP Vectra 5/90C Pentiums, each with 16MB of RAM, 256KB L2 cache, 540MB IDE hard disks with CMD PCI-EIDE controller, and Matrox MGA-PCI/2+ graphics controllers set to 800-by-600 resolution and 24-bit color.



CD-ROM VIDEO PLAYBACK TEST

	CD-ROM WinMark 96 (Score)	Intel Indeo video compression (320 x 240 resolution, 15 fps, 300 KBps)			Intel Indeo video compression (320 x 240 resolution, 30 fps, 600 KBps)			Custom AVI file (320 x 240 resolution, 30 fps, 750 KBps)		
		Frames dropped (out of 450)	Audio breaks	CPU utilization (percent)	Frames dropped (out of 450)	Audio breaks	CPU utilization (percent)	Frames dropped (out of 450)	Audio breaks	CPU utilization (percent)
4.4X drives										
Plextor 4PleX Plus	526	0	0	48	0	0	75	425	2	97
Toshiba XM-3601	447	0	0	60	0	0	98	458	2	98
6X and 8X drives										
Creative Labs Blaster CD 6x	340	0	0	55	0	0	91	77	0	99
Diamond Ultra Kit 8000 (8X)	465	0	0	56	6	0	98	315	0	99
NEC MultiSpin 6Xe	488	0	0	54	0	0	87	6	0	98
Philips PCA-62CR	374	0	0	56	0	0	92	86	0	99
Plextor 6PleX	585	0	0	50	0	0	79	0	0	88
Toshiba XM-3701 (6.7X)	512	0	0	61	12	0	99	332	0	99

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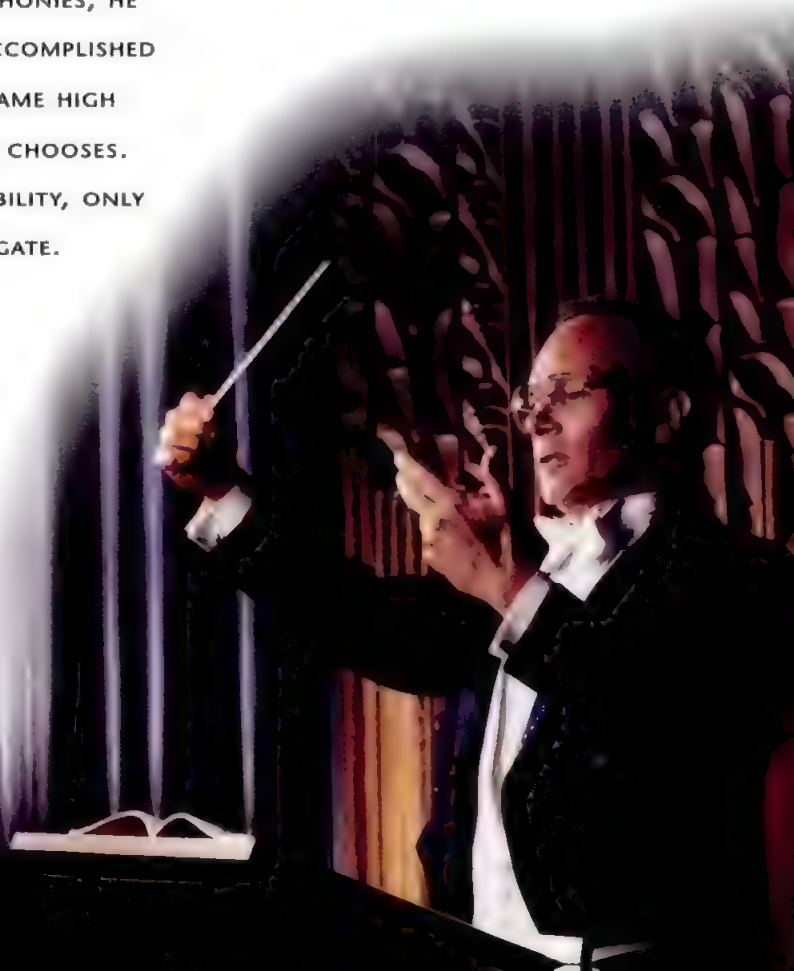
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CIRCLE 271 ON READER SERVICE CARD



4.4X Drives: A Flash in the Pan Worth Considering

By James Karney

Given the speedy extinction of triple-speed CD-ROM drives, it's reasonable to ask if any 4.4X models on the market are worth considering today. The current 6X and early 8X drives deliver the state of the art when it comes to raw speed, but some 4.4X models offer a competitive edge over newer rivals and can be had for about \$150 less.

As the name implies, 4.4X units boost raw performance by 10 percent over the aging quad-speed models, with sequential read times of about 600 to 650 KBps. But transfer rates are only part of the story. Seek and read times are another important factor in overall CD-ROM operations. In real-world applications, users often access small files or databases on CD-ROMs; how quickly a drive can find and access this data may mean more for perceived performance than raw speed.

For example, good engineering allowed the Plextor 4PleX Plus (which its maker says is a 4.5X unit) to produce the second-best WinMark result in our roundup, pulling ahead of five 6X drives and even coming in ahead of the new 8X Diamond drive. If you don't need the high raw throughput of a 6X drive for data-intensive operations such as running video clips, the \$359 4PleX Plus (\$449 for the external version) is a

real contender. We also liked the Toshiba XM-3601. Though not as quick as the Plextor, this 4.4X drive showed an improvement over standard 4X units.

Convenience is another consideration. With more and more applications needing several CD-ROM disks to hold all they have to offer, many users may opt to upgrade to a multi-disk changer, rather than a quicker drive.

Pioneer aims to satisfy both needs with its DRM-624X six-shooter (\$495). This 4.4X drive (676-KBps transfer rate) stacks up to six CD platters in a removable cartridge. It uses SCSI logical unit numbers (LUNs) to create six virtual drives on a single SCSI ID. We mixed six audio and data titles in a cartridge and ran the minijukebox off a variety of host adapters with two other CD-ROM readers. Windows 95 recognized the unit without a problem. We then attached it to a host adapter with three other CD-ROM drives. All nine platters showed up without a hitch, but it did take about 3 minutes to boot Windows 95.

There was also a drag on the system each time we swapped the drive's cartridge, as each disk was pulled and identified. After that, it only took a second to load a new platter from the cartridge and access it.

we tested, and this is an 8X drive. In real-world use, this means you won't necessarily get the performance edge that you might expect from an 8X unit.

On our demanding Custom AVI File playback test, the drive dropped 315 video frames out of 450—among the worst results we saw. When playing video somewhat more demanding than current standards (15 fps, 300 KBps), the Ultra produced test results that seemed smooth, dropping only 6 frames. We did notice that the drive was a bit noisy, perhaps because of the vibration of the plastic tray.

The Ultra is no barn burner and is only nominally an 8X drive, based on its raw throughput rather than overall performance. It's still a winner for home users who want clean video playback and fast games, and who are looking for a complete kit. But if you perform a lot of small file, graphics, or CD-ROM database work, this is probably not your drive.

Diamond Ultra Kit 8000. List price: \$599. Diamond Multimedia Systems Inc., San Jose, CA 95134; 800-468-5846, 408-325-7000; fax, 408-325-7070; CompuServe, GO DMNDONLINE; Web, <http://www.diamondmm.com>.

Circle 443 on reader service card

NEC Technologies Inc.

MultiSpin 6Xe

The MultiSpin 6Xe (\$599 list and street) is a bit like a luxury sedan. It may not be the fastest model, but it gets you there with style and comfort. The external version we tested had the best ergonomic design of any drive in this review, and was easy to install and operate.

The MultiSpin is no slouch when it comes to performance, but neither is it a leader. Its fourth-place WinMark score of 488 KBps would have been higher were it not for a middling 214-ms access time. That speed is more suited to an IDE drive, not a SCSI-2 device like the MultiSpin. Even so, it performed well with multimedia titles and video clips. There were a number of dropped frames during our killer Custom AVI File playback test, but visually the clip seemed smooth, and there were no breaks in the audio track.

The drive's real pluses come in day-to-day use. The feature set includes full front-panel audio controls (including volume and track skip) so you can easily play audio CDs, an LED panel showing drive status, Plug and Play installation under Windows 95, plus an automatic lens clean-

er and a double dust door for clean operation. The LED doubles as a diagnostic readout for testing and troubleshooting. The MultiSpin is quiet in operation, and power cable and audio connections are well marked and not cramped together. SCSI IDs are set using a push-button switch on the rear panel, rather than the dial-type device which is hard to read and prone to breakage.

If speed alone moves you, the MultiSpin may not be your best buy. But if quality and ease of operation matter too, it's well worth examining.

MultiSpin 6Xe. List price: \$599. NEC Technologies Inc., 1414 Massachusetts Ave., Boxborough, MA 01719; 800-388-8888, 508-264-8000; fax, 800-366-0476.

Circle 444 on reader service card

Philips Electronics

Philips PCA-62CR

The 6X Philips' PCA-62CR drive (\$299.95 list, \$280 street) is an IDE drive with few frills, and it requires some performance tweaking. Don't expect a rack of multimedia CD-ROM titles in the box, or even an IDE controller. The box contains the drive, an IDE cable, an

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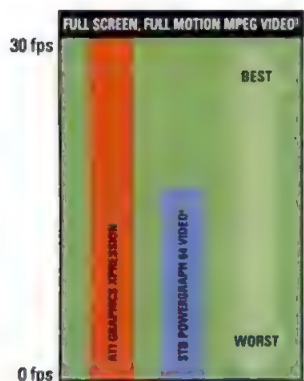


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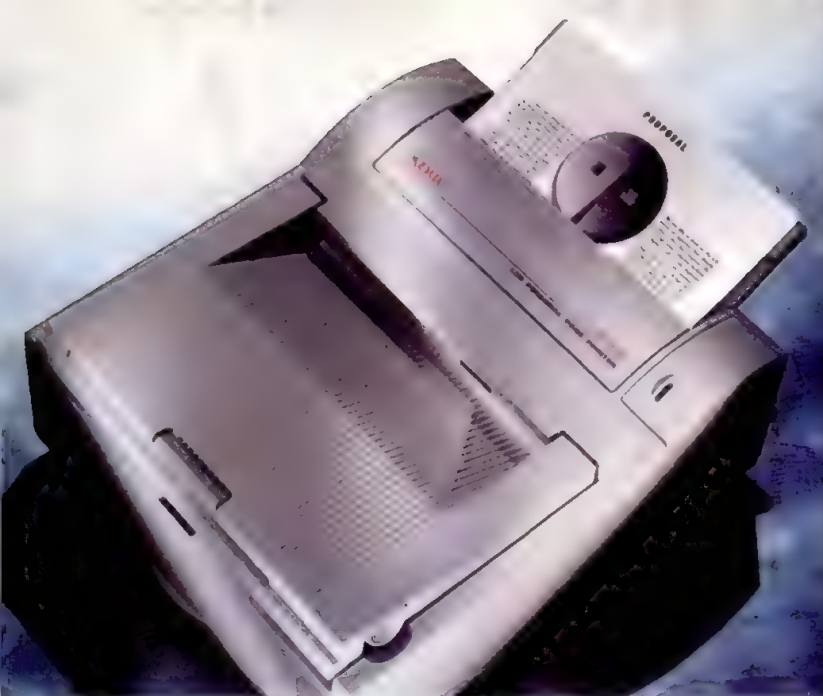
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SUMMARY OF FEATURES

CD-ROM Drives

	Creative Labs Inc. Blaster CD 6x	Diamond Multimedia Systems Inc. Diamond Ultra Kit 8000	NEC Technologies Inc. MultiSpin 6Xe	Philips Electronics Philips PCA-62CR	PC MAGAZINE EDITORS' CHOICE Plextor Corp. Plextor 6PleX	Toshiba America Information Systems Inc. Toshiba XM-3701
■ YES ■ NO						
Products listed in alphabetical order						
List price of internal version	\$299.99	\$599.00	\$499.00	\$299.95	\$459.00	\$415.00
List price of external version	N/A	N/A	\$599	N/A	\$549	\$515
Case dimensions (HWD, in inches)	N/A	N/A	3.0 x 6.9 x 13.0	N/A	2.2 x 7.0 x 12.0	1.7 x 5.9 x 9.8
Weight (pounds)	N/A	N/A	6.4	N/A	5.7	3.2
Length of supplied interface cable (feet)	N/A	N/A	3.0	N/A	3.0	3.3
Voltage switching between 110V and 220V	N/A	N/A	Auto-sensing	N/A	Auto-sensing	Auto-sensing
List price of interface	Included	Info not available	\$129	Info not available	Included	\$175
Mechanism manufacturer	Philips	Philips	NEC	Philips	Kenshi Shinano	Toshiba
Controller manufacturer	Oak Tech	Info not available	Adaptec	Philips	Future Domain or Adaptec	Future Domain
Uses disk caddies	■	■	■	■	■	■
Standards Supported						
CD-Interactive	■	■	■	■	■	■
CD-Plus	■	■	■	■	■	■
CD-ROM XA	■	■	■	■	■	■
Single-session Photo CD	■	■	■	■	■	■
Multisession Photo CD	■	■	■	■	■	■
Operating Features						
Power indicator	■	■	■	■	■	■
Busy indicator	■	■	■	■	■	■
Manual eject	■	■	■	■	■	■
Software eject	■	■	■	■	■	■
Headphone jack	■	■	■	■	■	■
RCA jacks	■	■	■	■	■ (external model only)	■
Volume knob	■	■	■	■	■	■
Red Book audio connector	■	■	■	■	■	■
Drawer can be locked to prevent theft of media	■	■	■	■	■	■
Performance Ratings						
Buffer size	256K	256K	256K	256K	256K	256K
Average access time (ms)	220	230	145	195	145	135
Data transfer rate (KBps)	900	1,200	900	900	900	1,000
Rated mean time between failures (hours)	30,000	50,000	100,000	30,000	100,000	100,000
Software and Customer Support						
Windows 95 Plug and Play-compatible	■	■	■	■	■	■
OS/2 driver support	■	■	■	■	■	■
Version of DOS CD-ROM Extensions Included	Info not available	1.00	Info not available	2.23	N/A	N/A
Toll-free technical support	■	■	■	■	■	■
Telephone support hours (eastern time)	9:00 A.M.-1:00 A.M., 7 days	8:00 A.M.-10:00 P.M. M-F, 11:00 A.M.- 7:00 P.M. Sat.	8:00 A.M.-8:30 P.M. M-F	9:00-5:00 M-F	9:30-8:30 M-F	12:00-3:00, 4:00-7:00, M-F
Web address	http://www.creaf.com	http://www.diamondmm.com	http://www.nec.com	None	None	www: http://www.toshiba.com
24-hour BBS	■	■	■	Info not available	■	■
Warranty	1 year	1 year	2 years	1 year	2 years	1 year

N/A—Not applicable: The product does not have this feature.

internal audio cable, a driver disk, and a short manual. This product seems aimed at the VAR market, and at integrators who want low cost without any extras.

The Philips does sport full audio controls and a headphone jack on its front panel, and the connectors and jumpers on the back are well marked and easy to use. Any user with minimal hardware installation skills should be able to get the drive running without problems.

Under DOS (using our PC's built-in

IDE controller), the drive manages a respectable 950-KBps transfer rate. But as with the Creative Labs drive we reviewed, getting full 6X speed under Windows 95 using the Creative Labs-supplied drivers on our tests was another matter. The Philips produced the second-lowest WinMark score in our roundup, 374 KBps, with a 281-ms access time. Avoiding the bundled drivers, we were able to get acceptable 6X throughput. Philips should be bundling the improved drivers by the time

you read this.

As for video performance, the Philips dropped 86 frames on our Custom AVI File test, putting it roughly in the middle of the pack. Playback of less demanding video was smooth, however, with no audio breaks.

Philips supplies parts for many popular CD-ROM drives. In its physical construction this unit is better than the average IDE reader. The updated drivers should let it fulfill its full potential.



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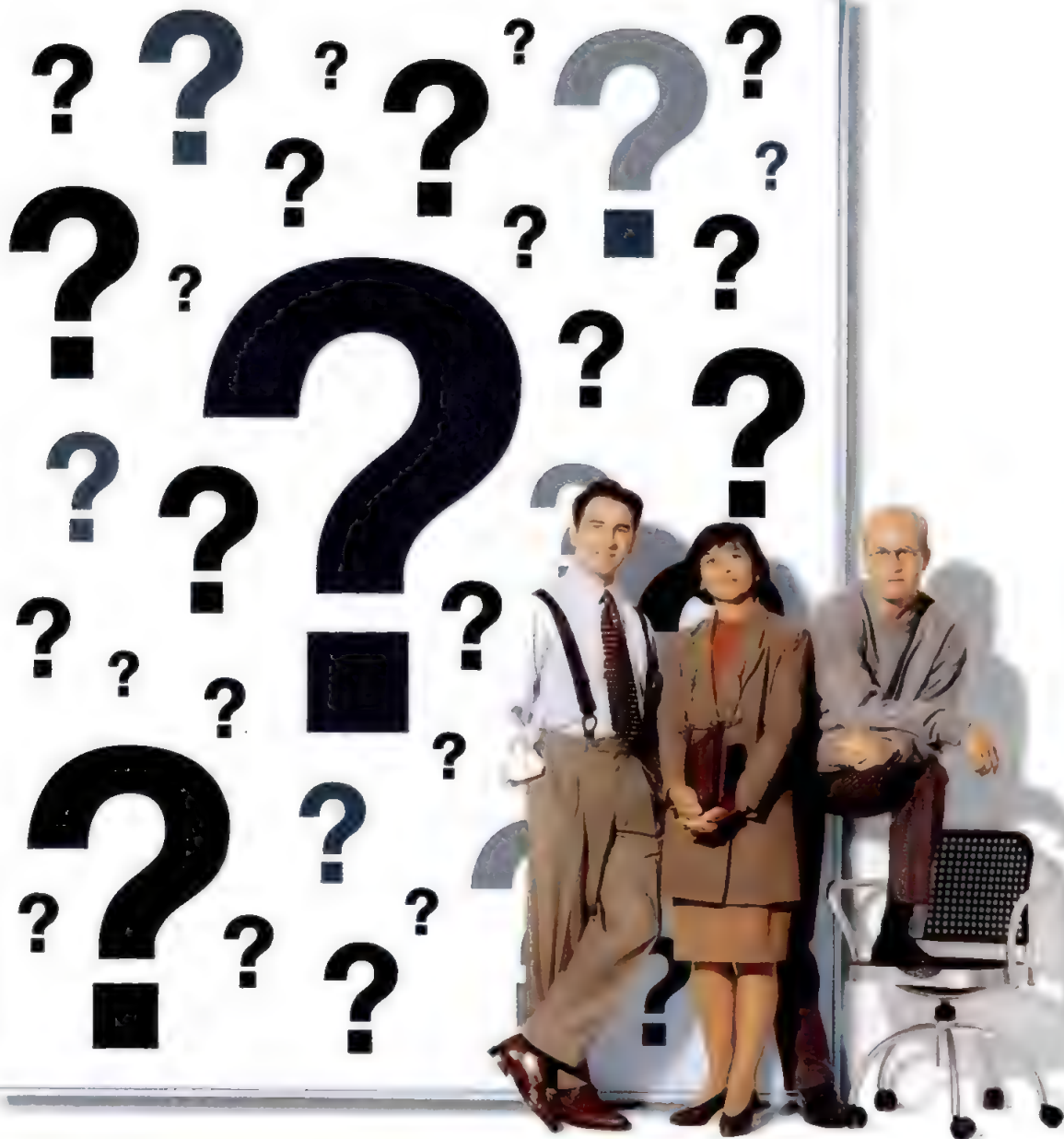
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CD-ROM Drives

Philips PCA-62CR. List price: \$299.95. Philips Electronics, 2099 Gateway Pl., #100, San Jose, CA 95110; 800-235-7373, 408-453-7373; fax, 408-453-0680; Web, <http://www.philips.com>.

Circle 445 on reader service card

Plextor Corp.

Plextor 6PleX



The word *quality* may not be stamped into the metal chassis of the Plextor 6PleX—a SCSI CD-ROM drive—but it's certainly built into the design. At \$459, this isn't the cheapest internal drive in our roundup, but the payoff

is outstanding performance, solid construction, and easy installation.

An attention to detail was obvious as soon as we opened the box. Inside we found an installation kit, complete with mounting rails, screws, one SCSI ribbon, two sound card cables, a disk caddy, and a clear, task-based manual. There are audio playback controls on the front of the drive, and a locking tab on the sound card cable to keep it from working loose while you install the unit. The 6PleX is fully Plug and Play-compliant, and when married to the optional Adaptec AHA-2940 PCI host adapter, it also conforms to the SCSI SCAM (SCSI Configured Auto-Magically) standard. Setup was the easiest of any drive we tested.

The drive turned in the highest score of all the models we tested on our WinMark tests (585 KBps), thanks in part to a swift 151-ms access time coupled with a transfer rate of 911 KBps. Multimedia performance was outstanding, with flawless video and audio playback at all frame rates. It was the only drive not to drop video frames on our demanding Custom AVI File playback test, and it accomplished this while exhibiting the lowest CPU utilization of all six machines (88 percent).

The Plextor 6PleX is compatible with Plextor's CD-ROM towers, aimed at the network server market, which can seat up to seven SCSI devices in a hot-swap tower.

As a CD-ROM drive that can go the distance for any task you throw at it, from general apps to databases to multimedia and games, the Plextor 6PleX

should be at the top of your list.

Plextor 6PleX. List price: \$459. Plextor Corp., 4255 Burton Dr., Santa Clara, CA 95054; 800-475-3986, 408-980-1838; fax, 408-986-1010.

Circle 446 on reader service card

Toshiba America Information Systems Inc.

Toshiba XM-3701

The Toshiba XM-3701, a 6.7X external CD-ROM drive (\$515 list), handles both general file operations and multimedia tasks with alacrity. But we noticed some obvious corner-cutting in this SCSI drive's physical design.

The Toshiba placed in the middle of the pack on our benchmark tests, with a WinMark score of 513 KBps and a respectable 147-ms access time with the bundled Future Domain TMC 850 SCSI host adapter. Its scores improved when the drive was paired with a more expensive Adaptec 2940 host adapter (not sold by Toshiba). Video and audio playback were flawless to the eyes and ears. That's the good news.

For those who want thorough documentation and easy access to settings, however, the Toshiba falls short. The manual is sparse at best and not aimed at the novice SCSI user. The case is merely a sheet of metal wrapped around the internal model of the drive. The power supply is a large brick (like the ones Toshiba sells with its laptops), adding clutter to your desktop. An inspection plate under the case is used to access jumpers, which are recessed and set at a difficult angle.

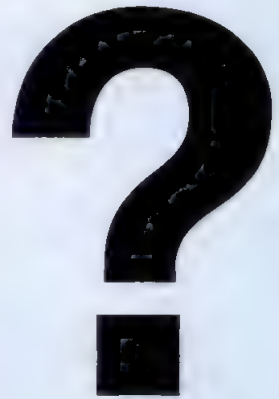
On the plus side, the caddyless tray has tabs so you can place the unit on its edge vertically, which many users will find convenient. A volume dial is the only audio control on the front panel, however. We could not get a disk out of the drive using the manual eject feature, and had to power up the unit in order to remove the trapped disk.

Those complaints aside, the Toshiba is a good performer. The internal unit is a quality product, and we hope to see a more user-friendly design in future versions of this external sibling. □

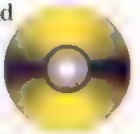
Toshiba XM-3701. List price: \$515. Toshiba America Information Systems Inc., 9740 Irvine Blvd., Irvine, CA 92718; 714-457-0777; fax, 714-583-3133.

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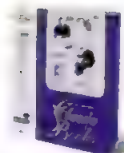
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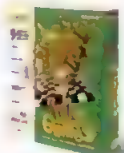
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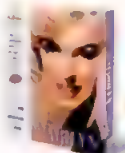
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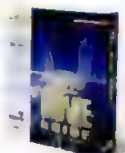
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CIRCLE 332 ON READER SERVICE CARD

PC Tech

THE DEFINITIVE GUIDE TO PC TECHNOLOGIES & TOOLS

Prepackaged Power: New OCX Controls

In the first of a two-part series, we review a cross-section of important new OLE controls.

By Stephen W. Plain

The Visual Basic custom control (VBX) has been an endangered species for some time, but the release of Microsoft Windows 95 and Microsoft Visual Basic 4.0 has sealed its fate. Its successor, the OLE custom control (OCX), brings a higher degree of respectability to the already hugely successful modular-components market. The OCX format is based on the well-documented OLE specification and is not linked to any particular development environment, as the VBX was to Visual Basic. The 32-bit OCX standard also frees component vendors from the 16-bit strictures of the VBX format.

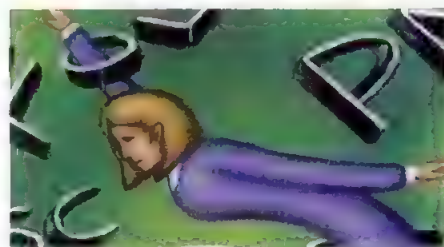
But for tools vendors, the migration from VBXs to OCXs has proved to be somewhat rougher than anticipated. Several months after the release of VB 4.0, the first new 32-bit control packages are just starting to appear.

The new format required VBX vendors to devote significant resources to porting their existing products. In addition to the new control for-

IN THIS SECTION



TUTOR Still don't know your UMBs from your URLs? Not sure if you want TAPI or TCP/IP? In the conclusion of a two-part series, Jeff Proise wraps up his discussion of the gnarly PC acronyms and abbreviations we need to know in order to make ourselves intelligible. *page 211*



INSIDE WINDOWS 95 Implementing a healthy set of OLE interfaces represents a steep climb, even for the best-conditioned programmers. We look at ways to make things easier by building OLE object containers using the facilities offered by Visual Basic and the more powerful Visual C++. While AppWizard-generated containers provide many basic services, we also look at examples of modifications to MFC classes that provide useful custom behavior. *page 219*



UTILITIES If command line PKZIP strikes you as a primitive way to manage zip archives, we offer a slick graphical replacement: ZipDrop is an extension to the Windows 95 shell that lets you add files to a .ZIP archive through simple drag-and-drop. We also look under the covers at how ZipDrop integrates itself into the shell by using interfaces derived from the Component Object Model (COM) on which OLE is based. *page 229*

ALSO IN THIS ISSUE PC Solutions looks at approaches to booting Windows 3.1 from Windows 95, protecting your Program Manager settings with a hidden batch file, writing menu systems that can eject a CD-ROM, creating a bogus SHARE program to fake out DOS apps running under OS/2, and an Excel macro for changing the case in a block of text. Examples and downloadable code help you implement these and additional solutions yourself. *page 239*



mat, farsighted vendors had to keep tabs on the beta versions of both Windows 95 and VB 4.0 to ensure that their OCX behavior made the most of the new environment. These companies have had their hands full for the past year, and some are still struggling to get out their next-generation products. Development of 16-bit applications is also far from dead, and most of the established VBX vendors will be shipping 16-bit VBXs, 16-bit OCXs, and 32-bit OCXs in the same box during the transition period.

Here we take a look at five of the new releases that offer a wide variety of tools for the VB developer. Crescent Software's QuikPak Professional offers the largest collection of controls in this group and includes both OLE controls and library routines for a wide range of programming tasks. We looked at VersionStamper and StorageTools from Desaware, two specialized products that give you excellent control over your application's compatibility and address the VB programmer's need for an interface to compound document storage. We also examined the latest versions of Sheridan Software's popular Designer Widgets and VBassist, both of which were still a little undercooked at the time of our testing. All five packages in this roundup include both 16- and 32-bit versions of the OCX controls.

In our next issue, we will look at six additional controls from major vendors that are just becoming available as we go to press.

Sheridan Software

Designer Widgets 2.0d

ALL REVIEWS BY STEPHEN W. PLAIN

Sheridan Software's \$139 Designer Widgets 2.0d is an incremental update of the company's mini-collection of custom controls. Like the previous release, Version 2.0d includes Sheridan's dockable toolbar, FormFX, and Index Tab controls, as well as a new Notebook control. All four come in VBX, 16-bit OCX, and 32-bit OCX formats. While this upgrade improves on some features of the controls, its slow design-time performance and quirky properties interface show that the product still needs work. While the four controls in Designer Widgets do not add up to a comprehensive set by any means, they add some useful flexibility to VB's forms, tabbed dialogs, and toolbars.

The dockable toolbar control lets your toolbars dock to the left, right, top, or bottom of an MDI (Multiple Document Interface) form and even float around much like the Toolbox window in the VB design environment. You can add multiple toolbar controls to the same form and have them share the same docking space. The robust Toolbar Designer offers a very visual approach to creating and managing custom toolbars.

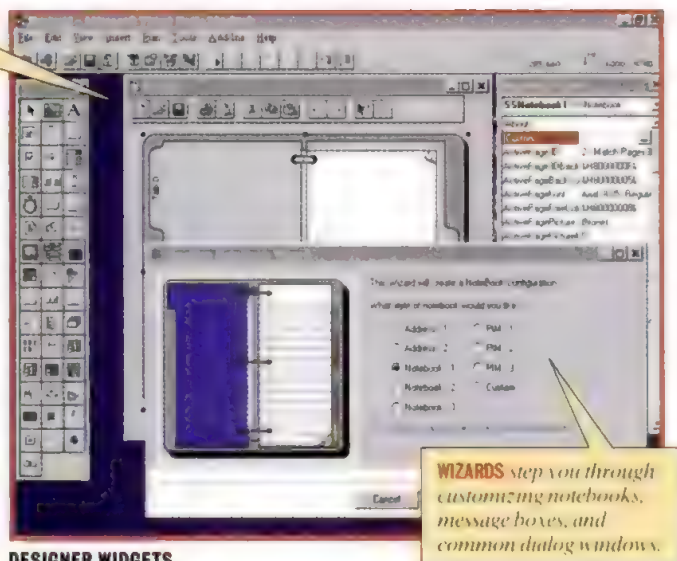
THE DOCKABLE TOOLBAR control can float or be docked at any edge of your form.

The Toolset Editor lets you define groups of related controls that you can later use to create toolbars. Each Toolset can include several bitmaps for each of its buttons that reflect up/down and enabled/disabled states. A separate program, the Toolset Bitmap Editor, lets you design your own bitmaps and control how they are to be arranged in the Toolset. Although the dockable toolbar is a nice improvement over VB's standard control, we were unable to implement one of its most attractive-sounding features, the ability to add combo boxes and other child controls directly to the toolbar. Even the example exercise taken directly from the manual failed to work.

The Index Tab provides a flexible way to build custom-made tabbed dialogs. You can fully customize the look of each tab, the number of tabs in each row, and whether the tabs appear at the top, side, or bottom. The biggest plus is that on each tab you can place multiple "pages" that resemble paper pages. Each page can contain its own child controls and be "turned" by the user with the small earmarks in the top corners. The Notebook control is essentially the Index Tab control with a notebook look. It also animates the pages as you turn them.

Although the Index Tab and Notebook controls are an improvement over vanilla VB, we were frustrated by some of their behavior. We found that when we turned a page of the Notebook control at runtime, the controls residing on the next page were drawn before the previous page turned, a mediocre animation that fails to convince.

Another rough spot involved the data-aware functionality of both controls. You can bind the Index Tab and Notebook controls to a particular field in a data control on your form. When you do so, the captions on each tab are changed to the values in this field at runtime. But the tab interface does not provide default behavior suitable for a quick tabbed database. We placed text boxes on each tab and bound them to fields in the data control. While the tab captions did display the database values when we navigated the tabs, the values in our added text fields remained the same when we switched tabs at runtime. We were able to build our tabbed database, but only by adding code



to move the data control's record pointer when we clicked on a new tab.

FormFX is an interesting control that lets you totally change the caption bar in your form to accommodate multiple lines of text, bitmaps, and custom fonts. Unfortunately, this release of FormFX does not support Windows 95 control boxes, so forms we modified appeared as Windows 3.1-style windows. We also experienced extremely slow performance when we changed the caption text of the FormFX control. As we typed caption text into the property field, each letter took 1 or 2 seconds to appear.

Throughout Designer Widgets, Sheridan uses its new Property Page dialog to give you right-click access to each control's properties. We found this dialog to be excessively slow in loading and less useful and harder to navigate than Microsoft's standard tabbed dialog.

Designer Widgets has its attractions but could benefit from more time in its programmers' hands. If and when its problems are addressed, it may yet prove to be a helpful if slightly pricey addition.

Designer Widgets 2.0d. List price: \$139. Sheridan Software Systems Inc., Melville, NY. 800-823-4732; Web, <http://www.shersoft.com>.

Circle 482 on reader service card

Crescent Software

QuickPak Professional 4.0

One of the secrets to high programming productivity is having a formidable arsenal of components and code on call. Crescent Software's QuickPak Professional 4.0 gives you just that. Its wide range of tools augment VB's capabilities, and its numerous sample projects show you clever ways to use them. QuickPak comprises a set of 30 custom controls, hundreds of custom DLL func-

tions, and scores of specialized Visual Basic routines. In essence, it's like inheriting a hard disk from

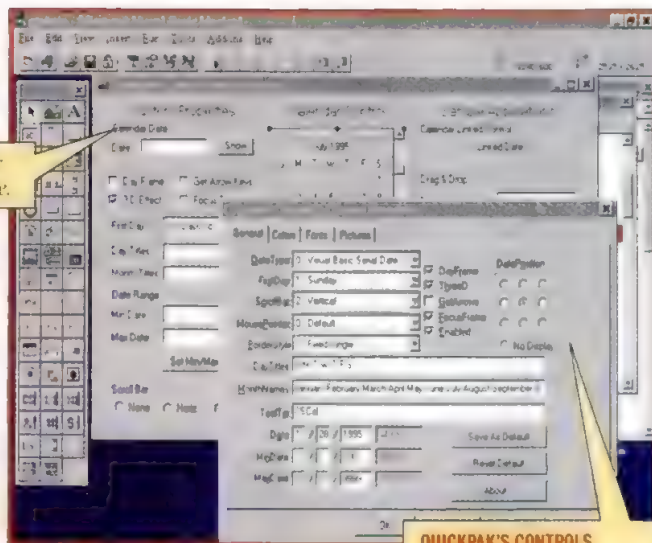
SAMPLES are included for every control and routine.

a prolific VB developer. QuickPak Professional sells for \$249 and includes 16- and 32-bit versions of its OXC controls.

QuickPak's stable of OXC controls includes enhanced replacements for several of the standard VB 4.0 controls as well as others that provide new functionality. Among the enhanced replacements are Crescent's own versions of the label, check list, command button, combo box, list box, and masked edit box controls. The roster of new controls includes a calendar, a clock, a hyper-text label, an invisible button, a caption, and a form-enhancement control. Although the replacement controls fully match the basic behavior of their standard VB counterparts, they are totally separate components and can even be used in conjunction with the standard ones. The consistency of their properties and methods is such that you will feel comfortable using them as one-for-one replacements.

While some of the replacements offer only slight improvements over their VB counterparts, others offer significant advantages. For example, the CSCmdBtn control, Crescent's command button, adds properties you can use for quickly assigning common database operations or placing captions and bitmaps on the button's face. After setting CSCmdBtn's DataSource property to a data control on your form, you can set its DataMethod property to operations such as Add Record, Delete, Move First, or Move Last. Not only can you place pictures and captions simultaneously, you can specify whether the caption appears to the left, right, top, or bottom of the picture. QuickPak also includes replacements for the common dialog and masked edit box controls. Unlike the standard VB versions, these appear in your Toolbox as separate controls for each type of edit box and dialog. For example, there are separate controls specifically tuned to handle currency, double-precision, date, integer, time, and formatted text values. A flexible search-and-replace dialog control is included as well.

One of the most useful controls is the invisible form-extension control, CSForm. Its scrollbar properties let you create scrollable forms



QUICKPAK PROFESSIONAL

QUICKPAK'S CONTROLS include plenty of properties and make excellent use of property sheets.

and it can accept filenames dragged from File Manager or Explorer and dropped into a control. More important, it adds some nice new events that increase your programmatic control. CSForm can detect changes to WIN.INI, the print queue, the Clipboard, and font settings, as well as other environmental changes. It will also fire a MouseEnter event as you move the mouse pointer over each control on your form, letting you create context-aware applications.

Although the control collection is a worthy product in itself, QuickPak also includes a set of DLLs and Visual Basic .BAS source modules that provide a wide array of functions. These include highly targeted routines ranging from low-level tasks such as array processing and bit manipulation to high-level ones such as adding visual effects to your forms and controls. While the DLLs contain the functions, several Visual Basic source modules are included that give you a running start on implementing them. All the routines and controls in QuickPak are demonstrated with VB sample projects. And, unlike some otherwise

GET TO THE HEART of information in compound documents that are based on OLE structured storage.

robust libraries, we found QuickPak to be well documented and the sample source code to be adequately commented.

QuickPak Professional is an excellent collection. Although you can use its OXC controls in many development environments, it is primarily aimed at VB developers and includes only VB source examples. Whether you use QuickPak only for its controls or you fully exploit its wealth of routines and starter code, you'll find it to be a useful and instructive suite.

QuickPak Professional 4.0. List price: \$249. Crescent Division of Progress Software, Bedford, MA. 800-352-2742; Web, <http://www.progress.com/crescent>.

Circle 483 on reader service card

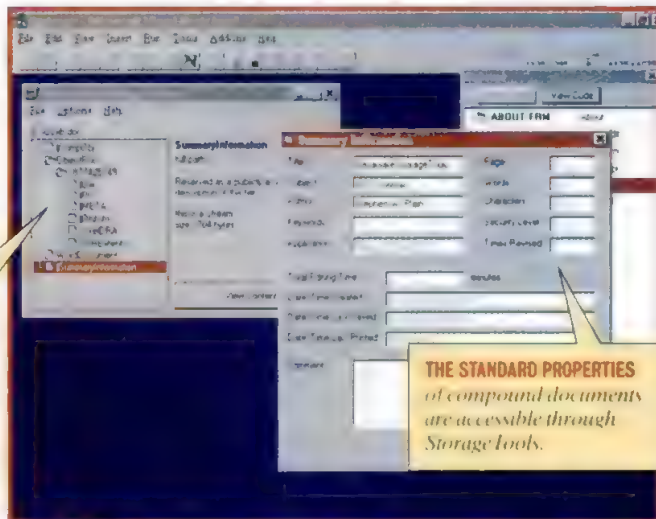
Desaware

StorageTools 1.0

Desaware's \$129 StorageTools offers a pair of OLE custom controls that can keep your VB applications on the cutting edge of Windows technology. The Desaware Storage control lets you manipulate OLE structured storage data files, while the Registry control gives you powerful access to the Registry in Windows 95 and Windows NT. The package includes both 16- and 32-bit versions of each OXC.

The OLE structured storage file system is a powerful way to manage your application documents in memory as well as on disk. It's also the file format used by the latest versions of many popular applications, such as Microsoft Word and Microsoft Excel. By using structured storage for your application data, you may be able to avoid using a linked database just to store application documents.

While the powerful OLE structured storage format was designed for C++ programmers, the Storage control in StorageTools gives it a VB programming interface. The reason this OLE format is so powerful is that the standard binary and sequential file types commonly associated with Basic are re-



THE STANDARD PROPERTIES of compound documents are accessible through StorageTools.

STORAGETOOLS

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Your computer won't do much at once. So you install more RAM. And what happens? You end up with a really expensive computer that won't do much at once. That's because physical memory does nothing to eliminate Windows® memory bottlenecks. Connectix RAM Doubler™ software fixes that by increasing system resource space, reclaiming unused memory and compressing existing memory. It installs in 15 seconds and works automatically every time you start Windows. So now with RAM Doubler you get to run more applications at once and turn that costly paperweight sitting on your desk into the powerful computer it was meant to be.

System requirements: A PC equipped with a 386/486. Double the available system memory. Windows 3.11 or Windows 95. Windows 95 requires 10 MB of free hard disk space. RAM Doubler is a trademark of Connectix Corporation. © 1997 Connectix Corporation. All rights reserved. Connectix, the Connectix logo, and RAM Doubler are trademarks of Connectix Corporation. Windows and Windows 95 are trademarks of Microsoft Corporation. connectix.com • RAM Doubler is a trademark of Connectix Corporation • All other trademarks are the property of their respective holders



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CIRCLE 302 ON READER SERVICE CARD

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It's about time.

placed by a hierarchical format that essentially contains a user-defined directory structure inside each data file. Exactly the same format can be created in memory as well, providing fast document management for your application while it's running. Since the memory and disk formats are identical, your application can allow the user to work with compound documents in memory and then simply save them to identical data files on disk as needed.

Compound documents contain a tree structure that has two types of values: storages and streams. Each storage is similar to a disk directory in that it can contain multiple streams or storages beneath. Each stream is a chunk of information that can theoretically be gigabytes in size. Some streams contain fixed sets of properties for other applications to access. For example, the Summary Information stream is a standard property set that corresponds directly to the summary information fields you see in Word and Excel.

The Storage control contains no accessible properties or events. Instead, it provides a mechanism for generating and manipulating Visual Basic object variables that represent root storages and streams. You declare the object variables manually and then invoke the Storage control's methods as well as the root storage and stream objects' methods after the control creates them.

Two excellent examples are included: a demonstration of writing a compound document to disk and then loading it back into memory and a program that saves the contents of a VB OLE container to disk and loads it into another OLE container. There is also a Structured Storage Viewer program, with its VB source code, that uses the Storage control to let you view the contents of any compound document.

Once we closely examined the sample source code, we found that it was quite easy to generate our own compound documents. We also found the Structured Storage Viewer program to be a very interesting tool for exploring the contents of existing documents. The OLE stream methods closely parallel the VB functions for binary file access: Get/Put, VariantGet/VariantPut, and GetString/PutString.

The other half of StorageTools is its Registry control. The Registry in Windows 95 and Windows NT has a very specific importance for applications developers. Ideally, your 32-bit applications should use the Registry instead of the custom .INI files you use with Windows 3.1 to store application settings and version information. While Visual Basic provides basic functions to store and retrieve your application's settings from the Registry, Desaware's Registry control gives you more freedom and easy-to-understand properties and methods. The package also includes a nice sample pro-

gram called Registry Browser that clearly illustrates how to manipulate the Registry.

StorageTools is a very timely package for those of us beginning to deliver Windows 95 applications. If you want to bring your VB applications to the next level, StorageTools is a great way to get there.

StorageTools 1.0. List price: \$129. Desaware, Campbell, CA. 408-377-4770; Web, <http://www.vbxtras.com/~desaware>.

Circle 484 on reader service card

Sheridan Software

VBAssist 4.0

VBAssist has long been one of the most popular Visual Basic tools and has consistently added useful features that one can only wish were in the core VB product. Although VBAssist is technically a VB Add-In and does not include any OLE custom controls, its ever-growing feature set deserves a close look. Unfortunately,

A UTILITY to help you create icons, bitmaps, and cursors to use with your controls is included.

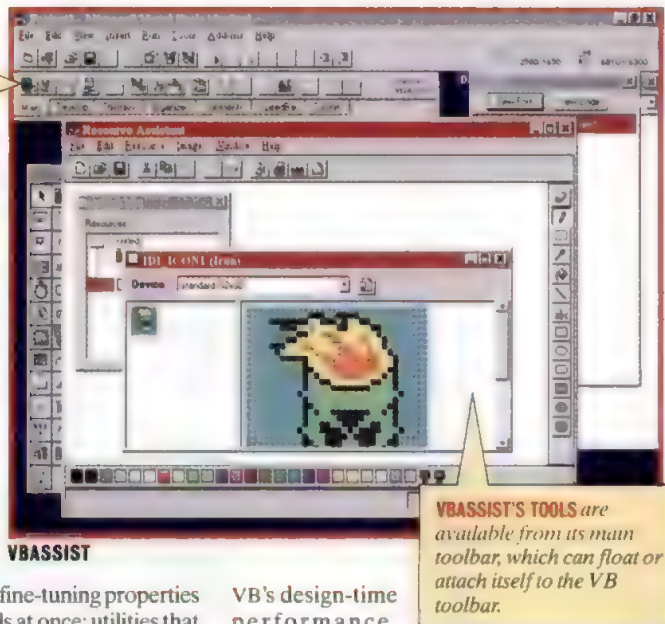
we found that Sheridan has bitten off more than it can chew with this new, \$179 release. VBAssist 4.0, which includes both 16-bit and 32-bit versions, delivers a bigger, more impressive feature set than ever, but at the cost of slow performance and instability.

In VBAssist you'll find a wide array of features that seem just too good to pass up: tools for fine-tuning properties across a variety of controls at once; utilities that help you comment your code with the press of a button; wizards to step you through creating projects, message boxes, and common dialogs; database tools, and more. Once you've enabled the VBAssist Add-In through the VB Add-In Manager, the product's main toolbar loads up automatically when you start a VB session. The VBAssist toolbar is organized with tabbed pages, including a Custom page that can hold buttons for your most commonly performed VB and VBAssist operations. The product also attaches itself to VB's context menus, giving you right-click access to many VB features.

VBAssist was actually written, in large part, using VB; the product's slow performance bears witness to that fact. With VBAssist running, our VB sessions slowed dramatically and certain operations practically brought them to a halt.

One of these slowdowns occurred when we used the product's new Control Template feature. Control Templates let you store groups of controls for later use in forms, something that can be especially useful for giving your applications a consistent look and feel. To test this feature, we created a template comprising 16 text boxes with captions and then attempted to apply the template to a new form. The results were not encouraging. After we dragged the template to the target form, our Windows resources slowly drained to the point where the operating system crashed. But with further experimentation, we determined that the practical limit for this promising feature lies at around ten controls. Attempts with more controls were either unacceptably slow or failed because of resource constraints.

Our tests with the 32-bit version of VBAssist showed it to be unpredictable and unstable as well as an exceptional drain on



VB's design-time performance.

We tried using the product's Property Synchronization feature to apply selected control properties from one control to several others, but found that one of the most important properties, the control's font characteristics, would not transfer. In the Property Assistant dialog, which lets you target specific property categories, we experienced repeated general protection faults after examining and changing a few properties and then editing a property filter (a definable subset of properties).

We did find the new Resource Assistant to be a good fit for VB. Although VB 4.0 lets you add resource files consisting of bitmaps, icons, and cursors to your projects, unlike other development systems it does not give you a utility to create these small but significant elements. Both 16-bit and 32-bit ver-

sions of the Resource Assistant are included, and the interface is straightforward and efficient. We were also successful in using the product's alignment palette to position and resize groups of controls and the Messagebox Wizard that steps you through creating message boxes in your code.

VBAssist 4.0 is one of those tools you hate to go without because of the way it smooths the bumps of the development experience. At the same time, it's impossible to overlook the problems with this new version. For a productivity tool, its performance is unacceptable, and its unpredictable behavior is the last thing you need when you're trying to write code. We expect that Sheridan will address all the bugs and make VBAssist's impressive set of features work well; when it does, VBAssist will be a great addition to your toolbox. Until then, our best advice is to pass on the current release.

VBAssist 4.0. List price: \$179. Sheridan Software Systems Inc., Melville, NY. 800-823-4732; Web, <http://www.shersoft.com>.

Circle 485 on reader service card

Desaware

VersionStamper-VB 4.0

As the name implies, Desaware's \$129 VersionStamper-VB 4.0 helps you embed version information into your VB executable. But its capabilities extend much further, providing you with a foundation for adding powerful conflict-resolution routines to your programs.

Although standard VB 4.0 now lets you put your application's version information directly in the compiled executable as a version resource, the VersionStamper control allows you to add precise details about embedded VBX and OCX controls you've used and even about DLLs and external data files. It also lets you respond in a graceful manner to conflicts that may crop up at runtime. VersionStamper includes both 16-bit and 32-bit versions of the OLE controls, as well as a 16-bit VBX version. The VBX version lets you embed version information into a VB 3.0 executable.

VersionStamper is wisely designed as a two-level product. For the casual VB user, its custom control provides an interactive way to specify the files your application needs at runtime and check their version, size, or date at runtime. If a conflict arises, the control can trigger a warning dialog and shut

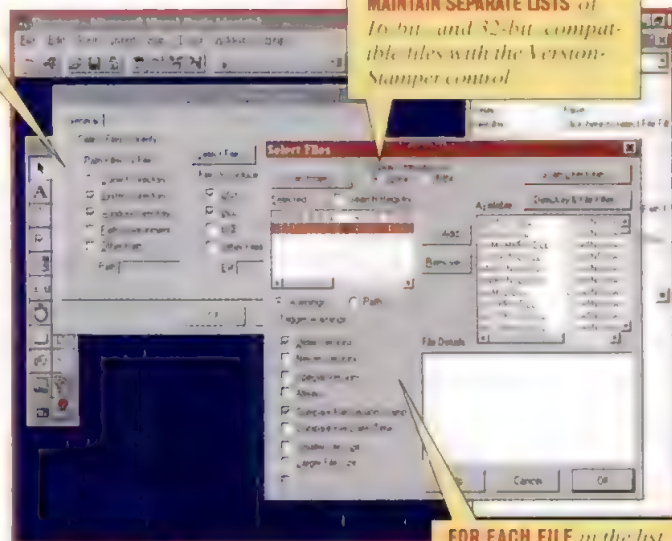
THE PROPERTY SHEET provides a clean yet powerful way to edit the control's properties

things down cleanly. For more advanced use, the control fires events that let you respond to just about any contingency, functionality that is ideal in cases where you need to make your application airtight for wide distribution. VersionStamper includes a complete collection of sample projects and forms that are specifically designed to be integrated into your own applications. Since incompatibilities can potentially keep your application from getting off the ground, there's also a sample that shows you how to use a small rescue program to scan your application executable for problems before it loads.

The VersionStamper control uses a property-sheet dialog, accessed by right-clicking, that offers an excellent study in the proper way to implement VB 4.0's context-menu feature for setting properties. The dialog asks for the types of files to compare and where to look. When you click the Select Files button on this page, a second dialog lets you build the list of compatible file versions and indicate how you want them checked. Here you can define separate lists for 16-bit and 32-bit versions, if you are distributing your application on both platforms. Two separate scanning features are available in this window that automate the process of building the lists. You can scan the VB project or scan directories of your choice for selected file types. After you build the lists, you can designate the type of checks to perform on each file, including version, date, size, and Registry status. This intuitive property dialog makes the product easy to use for developers of all levels.

Once you've told the VersionStamper control about the elements it should interrogate, you start the process by executing the Start-Verify method. We found the sample forms to

MAINTAIN SEPARATE LISTS of 16-bit and 32-bit compatible files with the VersionStamper control



VERSIONSTAMPER

be completely satisfactory for implementing VersionStamper, and we were able to integrate them into our projects very quickly. Of course, we still needed to add code to provide a proper response for each conflict, but for the most part it was a fairly painless task to implement a robust conflict-resolution system.

Like other Desaware products, VersionStamper offers the extra bonus of being highly instructional. The documentation includes explicit step-by-step explanations of the way both 16-bit and 32-bit OCX and DLL files are located and loaded. It also spells out in a clear fashion all the possible scenarios you need to watch out for, along with the VersionStamper solutions to each. For the curious and those who need to dig deeper into version stamps, there is a VerInfo utility program that displays a file's version information and that of its embedded components. There's even a chapter that tells you how to improve upon VB 3.0's Setup Kit.

When you're building applications for the masses, you need to predict and respond to all the potential problems that can inevitably crop up because of incorrect, out-of-date, or replacement copies of OCXs, VBXs, and DLLs on the target system. VersionStamper-VB is an excellent tool that lets you add a layer of protection to your application quickly and continue to fine-tune that protection later. The VersionStamper control's implementation of the property-sheet concept is among the most well-conceived that we saw in this roundup, and the product's documentation is superb. Like the company's DataStorage product, VersionStamper-VB gets two thumbs up. □

VersionStamper-VB 4.0. List price: \$129. Desaware, Campbell, CA. 408-377-4770; Web, <http://www.vbxtras.com/~desaware>.

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VersionStamper is an excellent tool that lets you add a layer of protection to your application quickly and continue to fine-tune that protection later.

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PC Tech/Tutor

By Jeff Prosis

Guide to Computer Acronyms, Part 2

Find out what all those perplexing capital letters mean.

The following list of acronyms and definitions is the second in a two-part series that began in the previous issue's Tutor column (January 9, 1995). Tear out these pages and combine them with the pages from the last issue and you'll have a handy list of common computer acronyms to help you as you read computing literature. Or you can download an electronic copy of the combined articles from PC Magazine Online. The file is named ACRNMS.ZIP, and you'll find it in ZD Net's Utilities/Tips Forum library on CompuServe (GO ZNT:TIPS) or in the issue archive file (Z15N02.ZIP) on other services as well as the Internet.

As in Part 1, this guide provides pronunciations for acronyms that are usually pronounced as words rather than spelled out letter by letter.

OCR (optical character recognition)

A technology that allows dots or pixels comprising characters in a bitmapped image to be converted into ASCII text. OCR is frequently combined with scanners to scan documents into a computer and convert the resulting information into textual data.

ODBC (Open Database Connectivity)

A standard promulgated by Microsoft that allows databases created by various database management programs—such as dBASE, Microsoft Access, Microsoft FoxPro, and Oracle—to be accessed using a common interface independent of the database file format. By relying on ODBC, one can write an application that uses the same code to read records from a dBASE file or a FoxPro file. Internally, ODBC drivers use a form of SQL to carry out database operations. See also *SQL* and *WOSA*.

OLE (Object Linking and Embedding) Pronounced "oh-lay." A complex specification that describes the interfaces used for such tasks as embedding objects created by one application within documents created by another, performing drag-and-drop data transfers within or between applications, creating au-

tomation servers that expose their inner functionality to other programs, extending the Windows 95 shell with custom DLLs, and much more. Version 1.0 of the specification was originally created for placing objects such as Excel spreadsheets inside documents created by other applications such as Microsoft Word for Windows. OLE 2.0 greatly expanded the scope of OLE and made the original name obsolete, but the name had achieved widespread recognition and was retained.

ible printers. For example, the command <Esc>&l16D, where <Esc> represents an escape character (the ASCII value 27), configures a PCL printer to print 16 lines per inch. PCL has become a de facto standard for laser and ink jet printers and is supported by virtually all printer manufacturers. *HP compatible* or *LaserJet compatible* means that a printer supports the PCL command set.

PCMCIA (Personal Computer Memory Card International Association)

A consortium of computer manufacturers that devised the standard for the credit card-size adapter cards used in many notebook computers. PCMCIA defines three card types: Type I cards can be up to 3.3 mm thick and are generally used for RAM and ROM expansion cards; Type II cards can be as thick as 5.5 mm and typically house modems and fax modems; Type III cards are the largest of the lot (up to 10.5 mm thick) and are mostly used for miniature hard disks. PCMCIA support is a major component of Windows 95's Plug and Play architecture, which automatically recognizes when PCMCIA devices are added and removed. (The simpler term *PC Card* has largely replaced this acronym to refer to these cards.)

PDA (personal digital assistant) A hand-held computer, such as the Apple Newton. PDAs typically use pens for input, rather than key-

boards, to conserve space.

PIC (programmable interrupt controller) Pronounced "pick." A chip or device that prioritizes interrupt requests generated by keyboards, serial ports, and other devices and passes them on to the CPU in order of highest priority. See also *IRQ* in Part 1.

PIF (program information file) Pronounced "piff." A binary file in which Windows stores configuration information about a DOS program. A PIF file includes such information as the path to the executable file, the amount of memory the program requires, and whether the window in which the program is run closes automatically when the program terminates.



PCI (Peripheral Component Interface) A 32/64-bit local bus architecture developed by DEC, IBM, Intel, and others that is widely used in Pentium-based PCs. A PCI bus provides a high-bandwidth data channel between system-board components such as the CPU and devices such as hard disks and video adapters. PCI is one of two widely adopted local-bus standards. The other, the VL-Bus, is primarily used in 486 PCs. See also *VLB*.

PCL (Printer Control Language) The printer language that drives HP DeskJet, LaserJet, and other Hewlett-Packard printers. PCL defines a standard set of commands enabling applications to communicate with HP or HP-compat-

PIM (personal information manager) Pronounced "pimm." A software application designed to store and manage "personal" information such as schedules, phone lists, and contact notes.

PnP (Plug and Play) The technology that lets Windows 95 automatically detect and configure most of the adapters and peripherals connected to a PC. A fully Plug and Play-enabled PC requires three PnP components: a PnP BIOS, PnP adapters and peripherals, and a PnP operating system. Adding a PnP-compliant CD-ROM drive, hard disk, monitor, printer, or other device to a PnP PC requires little more than making the physical connection. The operating system, in conjunction with PnP logic present in the BIOS and in the device itself, handles the IRQ settings, I/O addresses, and other technical aspects of the installation to ensure that the device doesn't conflict with other installed devices.

PPP (Point-to-Point Protocol) A protocol that allows a computer to connect to the Internet through a dial-in connection and enjoy most of the benefits of a direct connection, including the ability to run graphical front ends such as Mosaic and Netscape Navigator. PPP is generally considered to be superior to SLIP, because it features error detection, data compression, and other elements of modern communications protocols that SLIP lacks. See also *SLIP*.

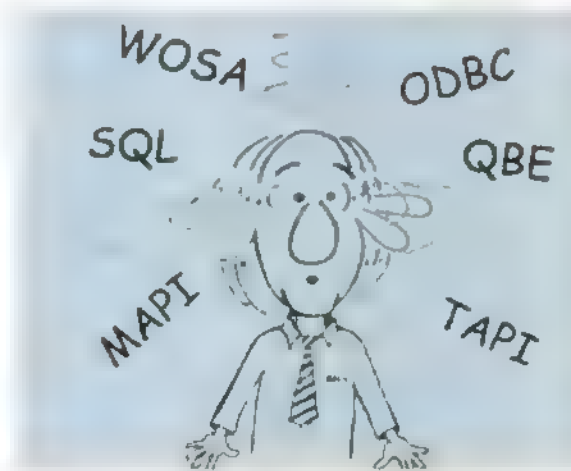
QBE (query by example) A database query method in which the user forms a query by filling in a table with examples of the requested information. IBM created QBE in the 1970s to simplify the process of retrieving information from mainframe databases; it was later implemented on the PC platform in such products as dBASE and Paradox. See also *SQL*.

RAM (random access memory) Pronounced "ram." The generic term for read/write memory—memory that permits bits and bytes to be written to it as well as read from it—used in modern computers. RAM comes in several forms, and manufacturers are continually coming up with new designs to provide the fastest possible access times at the lowest possible cost. See also *DRAM*, *EDO RAM*, *SRAM*, and *VRAM*.

ROM (read-only memory) Pronounced "romm." The generic term for memory that can be read from but not written to. A computer's BIOS is typically contained in ROM. This offers two advantages: The code and data in the ROM BIOS need not be reloaded each time the computer is started, and they can't be corrupted by wayward applications that write into the wrong part of memory. Some forms of ROM can be rewritten by applying higher-than-normal voltages to the inputs and holding the voltages for several milliseconds. See also *BIOS*, *EPROM*, and *EEP-ROM*.

RISC (reduced instruction-set computing) Pronounced "risk." A microprocessor architecture that favors the speed at which individual instructions execute over the robustness of the instruction set. The PowerPC architecture is one example of a RISC microprocessor design. (For details, see the Tutor column of October 24, 1995.) See also *CISC*.

SCSI (small computer system interface) Pronounced "scuzzy." A powerful and flexible



WOSA encompasses several APIs, such as TAPI, MAPI, and ODBC, which uses SQL instead of QBE to access a DBMS.

peripheral-connect interface popularized on the Apple Macintosh and used to connect hard disks, CD-ROM drives, tape drives, and other mass-storage devices to PCs of all types. SCSI and SCSI-2, an enhanced version of the original SCSI specification (now sometimes referred to as SCSI-1), excel at handling large hard disks and permit up to eight devices to be connected along a single bus provided by a SCSI connection. See also *IDE*.

SGML (Standard Generalized Markup Language) A text-based language for describing the content and structure of digital documents. HTML, which has gained fame as the language used to create World-Wide Web pages on the Internet, is a descendant of SGML. SGML documents are viewed with *transformers*, which render SGML data the way Web browsers render HTML data. See also *HTML* and *VRML*.

SIMM (single in-line memory module) Pronounced "simm." A form of chip packaging in which leads (pins) are arranged in a single row protruding from the chip. Connectors are attached to a stiff contact strip that permits a SIMM to be inserted into a slot like an expansion adapter. On PCs, SIMM-style RAM chips have virtually replaced the *dual in-line package* (DIP) chips, identifiable by two rows of

protruding legs, that were popular in the 1980s.

SLIP (Serial Line Internet Protocol) Pronounced "slip." A protocol that allows a computer to connect to the Internet through a dial-in connection and enjoy most of the benefits of a direct connection, including the ability to run graphical front ends such as Mosaic and Netscape Navigator. SLIP is also used to run TCP/IP over phone lines. See also *PPP* and *TCP/IP*.

SQL (structured query language) Pronounced "sequel." A query language developed by IBM that relies on simple English-language statements to perform database queries. Almost universally supported in one form or another by relational databases on platforms of all types, SQL allows databases from different manufacturers and on different types of computers to be queried using a standard syntax. See also *ODBC* and *QBE*.

SRAM (static random access memory) Pronounced "es-ram." A form of RAM that retains its data without the constant refreshing that DRAM requires. SRAM is generally preferable to DRAM because it offers faster memory access times (a critical element in a PC's performance), but it is also more expensive to manufacture because it contains more electrical components. The most common use for SRAM is to cache data traveling between the CPU and a RAM subsystem populated with DRAM; this boosts performance by reducing the number of DRAM accesses required. See also *DRAM*.

SVGA (Super Video Graphics Array) An extension of the VGA video standard. SVGA enables video adapters to support resolutions of 1,024 by 768 pixels and higher with up to 16.7 million simultaneous colors (known as *true color*). See also *VGA*.

TAPI (telephony application programming interface) Pronounced "tappy." A set of functions supported by Windows that permits Windows applications to program telephone-line-based devices such as modems and fax machines in a device-independent manner. One of numerous high-level device interfaces that Windows offers as part of the Windows Open Services Architecture (WOSA), TAPI simplifies the process of writing a telephony application that works with a wide variety of modems and other devices supported by TAPI drivers. See also *WOSA*.

TCP/IP (Transmission Control Protocol/Internet Protocol) A set of communication protocols developed by the U.S. Department of Defense that allows dissimilar computers to share information over a network. While networking two identical PCs is no longer a huge technological challenge, TCP/IP provides a solution to the stickier problem of connecting a Pentium PC to, say, a DEC minicomputer or a Silicon Graphics workstation. TCP/IP is the glue that binds the Internet.

Gateway 2000



Portable PCs



I needed out. My buddies in the programming lab were getting to me. So I tossed my Gateway Solo™ S120 Best Buy multimedia notebook into my pack and headed for the desert. Nothing like a little hot earth to clear the mind.

Man, I love this machine!

There I was. Miles from anywhere, just working away. Thinking — *man, I love this machine!*

Everything I need, right at my fingertips. A powerful 120MHz Intel® Pentium® processor, active matrix SVGA color display, 16MB RAM, whopping 1.2GB hard drive, and CD-ROM drive — it's high-end desktop power in a portable PC.

Perched on a rock, jamming to my favorite tunes (thanks to the 16-bit sound stereo speakers and CD-ROM drive), I watched the moon begin its journey across the night sky.

Off in the distance I saw headlights and heard the whining of an engine begging for a tune-up. Soon a battered old truck screeched to a halt in front of me. Over the dull roar of honky-



GATEWAY2000
S O L O

tonk music I heard, "Need a lift buddy?" Sure, why not.

"My name's Ned. And this here's Chuck."

He gestured to the armadillo curled up next to him. "I'm in 'crete." 'Crete? "Yea, lots of

opportunity in concrete. Spend a lot of time on the road. But I

like it that way. Say you got yourself a

pretty nifty Gateway 2000® notebook.

Me too. Wouldn't make a move without

Sally here," Ned smiled as he patted the

Gateway Solo V75 notebook sitting on the dash. Sally? "That's what I call her, after a certain waitress in Tucson," Ned winked at me. "Sally's

loaded. She

has a 75MHz

Pentium processor, 8MB RAM,

540MB hard drive, and CD-

ROM drive." He winked at me again.

Ned named his portable Sally.

"It has all the features I need while I'm on the road. Isn't that right Chuck?



EZ Pad™ pointing device for easy cursor navigation.

"I'm mighty fond of Gateway 2000.

Best values in portable PCs around,"

smiled Ned. "And their portable line has something for everyone."



Gateway Solo notebooks are optimized for Microsoft® Windows® 95.

More co more

The radio droned on as Ned, Chuck and I continued on our trek through the dark desert.

Armadillos like to have their heads rubbed. At least Chuck did. Up ahead I saw the neon sign of a roadhouse — a beacon in the darkness.



"I could use some grub. How 'bout you?" asked Ned as he pulled the truck into the dirt parking lot.

There she stood in all her glory. Tiara and satin dress shimmering beneath the fluorescent lights. "Next tour's in 15 minutes, honey," she said. Tour? "My name's Delilah, and I give the best moonlit desert tours in the West. Is that a Gateway

computing, places.

Solo
note-
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she asked
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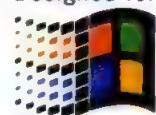
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TIFF (Tagged Image File Format) Pronounced "tiff." A popular file format for bitmapped graphics that stores the information defining graphical images in discrete blocks called *tags*. Each tag describes a particular attribute of the image, such as its width or height, the compression method used (if any), a textual description of the image, or offsets from the start of the file to "strips" containing pixel data. The TIFF format is generic enough to describe virtually any type of bitmap generated on any computer, but it is also complex and difficult to write software for.

TSR (terminate-and-stay-resident) The common name for DOS programs that terminate but remain resident in memory so they can operate in the background while other programs execute in the foreground. One of the first (and best-known) TSRs was Borland's Sidekick. By hooking keyboard interrupts, it could detect when a certain combination of keys was pressed and respond by popping up a window for the user to work in. TSRs were popular in the 1980s because they provided a means for a single-tasking operating system (DOS) to perform two or more tasks at once.

UART (Universal Asynchronous Receiver/Transmitter) Pronounced "you-art." The chip that drives a serial port. IBM chose the National INS8250, better known simply as "the 8250," for the serial ports in its original PC. Enhanced versions of that chip—or custom logic that mimics the functions of the 8250—are still used in PCs today.

UMB (upper memory block) A block of memory (between 640K and 1MB) created in upper memory by a 386 memory manager. This is useful for loading TSRs and device drivers so they don't occupy the limited memory below 640K. See also *TSR* and *UMA*.

URL (Uniform Resource Locator) A logical address that identifies a resource on the Internet. For example, the URL

<http://www.zdnet.com/~pcmag/utills/utility.htm>

is the Internet address of a Web page that gives you access to *PC Magazine's* utilities. In this example, *http* names the protocol (Hypertext Transport Protocol) used to access the page; *www* stands for *World-Wide Web*; *zdnet* is the institution that operates the server computer, in this case Ziff-Davis; *.com* signifies *company* (as opposed to *.gov* for government, *.org* for nonprofit organization, or *.edu* for educational institution); *~pcmag/utills/* is the directory on the host computer; and *utility.htm* identifies the HTML filename for the page itself.

VESA (Video Electronics Standards Association) Pronounced "vee-suh." The consortium of computer manufacturers responsible for the SVGA video standard and the VL-Bus, a local-

bus architecture. See also *SVGA* and *VLB*.

VFAT (virtual file allocation table) Pronounced "vee-fat." The 32-bit file system that Windows 95 uses to manage information stored on disks. An extension of the FAT file system, VFAT supports long filenames while retaining compatibility with (and many of the limitations of) FAT volumes. See also *FAT*.

VGA (Video Graphics Array) Also referred to as *Video Graphics Adapter*. The standard for the graphics adapter built into most IBM PS/2 systems, VGA quickly replaced earlier standards such as CGA (Color Graphics Adapter) and EGA (Enhanced Graphics Adapter) and made the 640-by-480 display showing 16 colors the norm. Other manufacturers have since extended the VGA standard to support more pixels and colors. See also *SVGA*.

VLB (VESA Local Bus or VL-Bus) The local-bus standard created by the Video Electronics Standards Association (VESA) to provide a fast data connection between CPUs and local-bus devices. The VL-Bus was widely used in 486 PCs, but most Pentium PCs use PCI local buses instead. See also *PCI*.

VR (virtual reality) The technology that uses computer-generated sights and sounds to transport users to new worlds that exist only inside the computer. A key component of virtual reality is *immersion*—blocking out the real world so as to make virtual worlds seem more real. A VR headset that combines computer-generated images displayed inches from the eyes with an audio component is a commonly used immersion tool.

VRML (Virtual Reality Modeling Language) An open standard for 3-D imaging on the World-Wide Web that paves the way for virtual reality on the Internet. The way VRML code describes a 3-D scene is analogous to four points describing a square, or a center point and radius describing a sphere. VRML viewers, similar to HTML Web browsers, interpret VRML data downloaded from the Web and render it on your computer. This allows the bulk of the processing to be performed locally and drastically reduces the volume of information that must be transmitted from the Web—a key consideration if rendering is to be performed in real time.

VRAM (video random access memory) Pronounced "vee-ram." A form of DRAM specially suited for video adapters. VRAM differs from common DRAM in that it features a "dual-ported" design allowing two devices to access it at once. Thus the CRT controller, which converts bits and bytes in video memory to pixels on the screen, and the CPU, which manipulates the contents of video memory, can access VRAM simultaneously. In video boards fitted with the less expensive DRAM, performance suffers somewhat because the CRT controller and the CPU must take turns accessing the video buffer. See also *DRAM* and *WRAM*.

WAIS (wide-area information server) A system for searching huge distributed database servers across a network, usually the Internet. WAIS allows you to perform a keyword search; it's analogous to an index, whereas Gopher, which is sometimes used as a complement to WAIS, is analogous to a table of contents.

WAN (wide area network) Pronounced "wan" to rhyme with "LAN." A geographically dispersed network formed by linking several computers or local area networks (LANs) together over long distances, usually using leased long-distance lines. WANs can connect systems across town, in different cities, or in different regions of the world.

WOSA (Windows Open Services Architecture) Pronounced "woe-suh." A collection of APIs that provide standard ways for Windows applications to access databases, telephony devices, messaging services, and other services. ODBC and MAPI are two examples of APIs that fall under the WOSA umbrella. See also *ODBC*, *MAPI*, and *TAPI*.

WRAM (Windows random access memory) Pronounced "double-you-ram." Similar to VRAM, but with added logic designed to accelerate common video functions such as bit-block transfers and pattern fills. WRAM is priced competitively with VRAM and can substantially speed up certain graphical operations such as video playback and screen animation. See also *VRAM*.

WWW (World-Wide Web) A collection of richly formatted hypertext "pages" located on computers around the world and logically linked together by the Internet. With a graphical Web browser such as Mosaic or Netscape Navigator, users can "surf" the Web by clicking highlighted words on the screen. Each click activates a hypertext link, connecting the user to another Web location identified by a URL. See also *HTML* and *URL*.

WYSIWYG (What You See Is What You Get) Pronounced "wizzywig." Screen output that exactly (or very closely) matches the appearance of printed output. WYSIWYG displays were once rare on the PC platform, because most applications ran in character mode and had little control over the format of text rendered on the screen. Today WYSIWYG applications abound, because Windows allows more precise control over screen formatting and provides a device-independent interface to both screens and printers.

XMS (Extended Memory Specification) A memory allocation scheme developed by AST Research, Intel, Lotus, and Microsoft that allows real-mode programs to use extended memory (memory above 1MB) without interfering with each other. Access to XMS memory is facilitated by an XMS driver such as Microsoft's HIMEM.SYS, which is supplied with Windows. □



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PC Tech/Inside Windows 95

By Richard Hale Shaw

Building OLE Object Containers

Tap the power—but not the complexity—of OLE with VB 4.0 and VC++.

The heart of OLE (Object Linking and Embedding) is its Component Object Model (COM), a protocol that specifies how OLE applications should interact. COM prescribes a complex set of scenarios that let disparate applications connect and communicate. Using the right combination of off-the-shelf applications and homegrown programming solutions, you can obtain data created by one application, store that data in another application's data files, and support visual editing of that data so that the two applications appear to operate as one.

COM allows an OLE application to invoke functionality contained in another, first by getting a pointer to an OLE interface supported by that application and then by invoking the functions implemented in that interface. This approach has two primary advantages. First, it lets each application (or component) think it's directly accessing interface pointers that point to functionality in the other's address space. Second, it lets COM hide the details of the connection so that components can reside in the same or separate address spaces, or even on separate systems.

That's the good news. The bad news is that OLE itself is largely a set of C++ pure virtual functions that offer interface descriptions but no implementation: It's not just an API you call, but an API you have to implement as well. Consequently, if you're a Windows developer intent on writing OLE-based applications, you've got a lot of work ahead of you. Even if you're a C++ guru, implementing a healthy set of OLE interfaces presents a steep learning curve that requires an understanding of how OLE uses these interfaces and the roles they play in making traditional Object Linking and Embedding possible.

Luckily, tools such as Visual Basic and Visual C++ make it possible to create OLE applications without having to produce volumes of code or write directly to the OLE interfaces. These tools provide a great deal of the implementation for you, allowing you to focus on how to adapt the implementations to your own scenarios rather than figuring out first how to

implement the interfaces and then how to use them. And the implementations each tool supplies conform to paradigms previously established for that tool, rather than to a paradigm established by OLE. The result? A shallower learning curve and a more natural means of building what would otherwise be an extraordinarily difficult application. By using these tools, you can stick to the paradigms you're already familiar and comfortable with, avoiding the mammoth task of implementing the dozens of interface functions OLE specifies.

We'll use these tools to illustrate how you can build OLE object containers, first by looking at

tion's files. Although the control lets you work with only one OLE object at a time, it does let you link or embed OLE objects and edit them via visual or open editing.

Adding the OLE container control to a Visual Basic application is easy: Just create a VB form and drag-and-drop the control from VB's control palette into the form (Figure 1). Or you can create an instance of the control programmatically. Once you've added the control to a form, you can modify the values of its properties or invoke its methods in order to massage its behavior.

The OLE container control supports the standard end-user "Insert Object" paradigm for creating new instances of OLE objects in a VB application, as well as programmatic creation of OLE objects at runtime. It also lets an end user paste OLE objects from the Clipboard.

The sample Visual Basic application included here demonstrates the use of the OLE container control in a small MDI application. When you run the program, you can use File | New to open a new MDI child window and invoke the Insert Object dialog. Once you select a new object to insert from this dialog, the container control will invoke the appropriate server and let you visually edit the object. When you wish, you can save the object to a disk file and then reopen the file to display the object in a window. And you can double-click the object to reinvoked its server or right-click to display the OLE verbs exposed by that object.

Using only about 100 lines of Visual Basic code (Figure 2), the sample program shows that you can build a simple OLE container without having to write directly to the OLE interfaces. Indeed, the program itself isn't terribly complex: It's largely a VB wrapper around the container control, which does all the work. Of course, VB is an interpreted language and, consequently, its performance will depend on the degree to which your VB application relies on interpreted code modules rather than compiled components such as the container control.

A MORE ROBUST SOLUTION WITH VISUAL C++
The Visual C++ environment—along with the Microsoft Foundation Classes—offers an en-

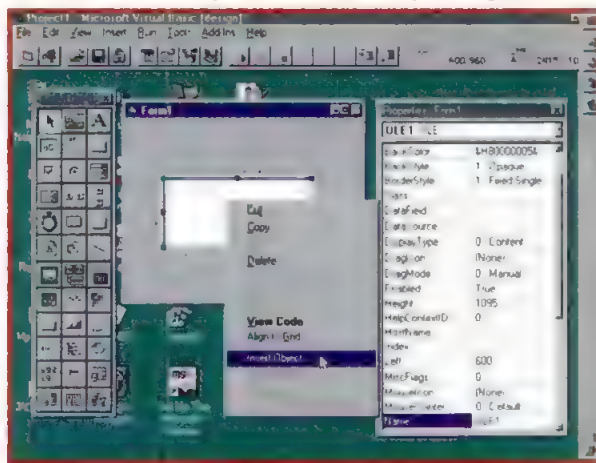


FIGURE 1: The OLE container control in a new VB form.

the component Visual Basic provides for OLE object containment. You can use it to create simple, single-object OLE containers that fit neatly into VB's event-driven paradigm. Then we'll turn to Visual C++, which—along with its application framework, the Microsoft Foundation Classes (MFC) Library—lets you build a more powerful OLE container with support for multiple objects, robust visual editing, and a polished, commercial look and feel.

THE VISUAL BASIC APPROACH

Visual Basic offers a simple solution for providing OLE container capabilities: an OLE container object in the form of a custom control. This control originally shipped as a VBX with Version 3.0 and is now available as an OLE control in Version 4.0. The OLE container control lets you save OLE objects in a VB applica-


```

Attribute VB_Name = "ModOLECont"
Option Explicit

Public MDINew As Integer

Sub NewObject()
    MDINew = True
    NewOLEForm
    If MDIfrm.ActiveForm.Ole1.OLEType = vbOLENone Then
        Unload MDIfrm.ActiveForm
    End If
End Sub

Sub DisplayInstructions()
    ' Declare local variables.
    Dim MsgText
    Dim PB
    ' Initialize the paragraph break variable.
    PB = Chr(10) & Chr(13) & Chr(10) & Chr(13)
    ' Display the instructions.
    MsgText = "To insert a new object, choose New from the File menu, and then select an object from the Insert Object dialog box."
    MsgText = MsgText & PB & "Once you have saved an inserted object using the Save As command, you can use the Open command on the File menu to view the object in subsequent sessions."
    MsgText = MsgText & PB & "To edit an object, double-click the object to display the editing environment for the application from which the object originated."
    MsgText = MsgText & PB & "Click the object with the right mouse button to view the object's verbs."
    MsgText = MsgText & PB & "Use the Copy, Delete, and Paste Special commands to copy, delete, and paste objects."
    MsgText = MsgText & PB & "Choose the Update command to update the contents of the insertable object."
    MsgBox MsgText, 64, "OLE Container Control Demo Instructions"
End Sub

Sub NewOLEForm()
    Dim Newform As New frmOLE
    Newform.Show
    ' Only display the Insert Object dialog box if the user chose New from the File menu.
    If MDINew Then
        MDIfrm.ActiveForm.Ole1.InsertObjDlg
    End If

    UpdateCaption
End Sub

Sub OpenObject()
    MDINew = False
    NewOLEForm
    OpenSave ("Open")
    If MDIfrm.ActiveForm.Ole1.OLEType = vbOLENone Then
        Unload MDIfrm.ActiveForm
    End If
End Sub

' Opening a new file will only work with a file that contains a
' valid OLE Automation object. To see this work, follow this
' procedure while the application is running.
' 1) From the File menu, choose New, and then specify an object.
' 2) Edit the object, and then choose Save As from the File menu.
' 3) Click the menu-control box for the object to close it.
' 4) From the File menu, choose Open, and then select the file you just saved.
Sub OpenSave(Action As String)
    Dim Filenum
    Filenum = FreeFile
    ' Set the common dialog options and filters.
    MDIfrm.ActiveForm.CommonDialog1.Filter = _
        "Insertable objects (*.OLE)|*.OLE|All files (*.*)|*.*"

    MDIfrm.ActiveForm.CommonDialog1.FilterIndex = 1
    MDIfrm.ActiveForm.Ole1.FileNumber = Filenum

    On Error Resume Next

    Select Case Action
        Case "Save"
            ' Display the Save As dialog box.
            MDIfrm.ActiveForm.CommonDialog1.ShowSave
            If Err Then
                ' User chose Cancel.
                If Err = 32755 Then
                    Exit Sub
                Else
                    MsgBox "An unanticipated error occurred with the Save As dialog box."
                End If
            End If
            ' Open and save the file.
            Open MDIfrm.ActiveForm.CommonDialog1.FileName For Binary As Filenum
            If Err Then
                MsgBox (Error)
                Exit Sub
            End If
            MDIfrm.ActiveForm.Ole1.SaveToFile Filenum
            If Err Then MsgBox (Error)
        Case "Open"
            ' Display File Open dialog box.
            MDIfrm.ActiveForm.CommonDialog1.ShowOpen
            If Err Then
                ' User chose Cancel.
                If Err = 32755 Then
                    Exit Sub
                Else
                    MsgBox "An unanticipated error occurred with the Open File dialog box."
                End If
            End If
            ' Open the file.
            Open MDIfrm.ActiveForm.CommonDialog1.FileName For Binary As Filenum
            If Err Then
                Exit Sub
            End If
            ' Display the hourglass mouse pointer.
            Screen.MousePointer = 11
            MDIfrm.ActiveForm.Ole1.ReadFromFile Filenum
            If (Err) Then
                If Err = 30015 Then
                    MsgBox "Not a valid object."
                Else
                    MsgBox Error$
                End If
                Unload MDIfrm.ActiveForm
            End If

            ' Set the form properties now that the OLE container control contains an object.
            UpdateCaption
            ' Restore the mouse pointer.
            Screen.MousePointer = 0
        End Select

        Close Filenum
    End Sub

Sub UpdateCaption()
    ' Set the form properties now that it contains an object.
    MDIfrm.ActiveForm.Caption = MDIfrm.ActiveForm.Ole1.Class + " Object"
    On Error Resume Next
End Sub

```

FIGURE 2: This simple container application, written in Visual Basic, uses the OLE container control.

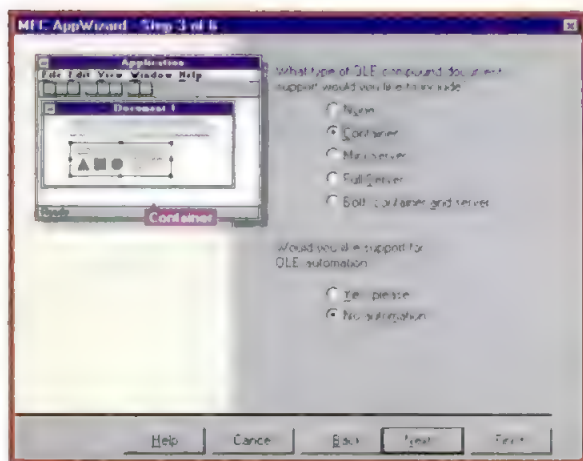


FIGURE 3: Creating a simple container application with Visual C++'s AppWizard.

tirely different approach. Where Visual Basic presents a single control that offers a specific subset of OLE container functionality, MFC provides a host of classes that implement a large number of OLE interfaces and encapsulates these implementations in a set of virtual functions you can override in a derived class. Thus, you can write an MFC application that inherits an implementation, but alter or replace the behavior of that implementation by creating a new class along with new implementations of specific virtual functions.

The AppWizard-generated container works because of built-in container support in MFC—in particular, MFC's implementation of a number of OLE interfaces and the encapsulation of these implementations in certain key MFC classes. For instance, MFC provides a class, `CDocument`, that lets you define document file formats and specify how an application will read and write its own document files. MFC extends this class to let you create OLE compound documents by providing a derived class, `COleDocument`, that lets you store embedded

You can create a simple container application with Visual C++ using the AppWizard (Figure 3). AppWizard's Step 3 lets you select options to include simple object container support in a standard MDI or SDI application, with the ability to add embedded or linked objects via an Insert Object entry in the Edit menu. AppWizard generates all the requisite MFC code, including a special menu with only File and Window commands that the container uses during visual editing. Once you compile and run the generated code, you can use the resulting executable to link or embed OLE objects in each window of the application.

objects and linked-object information in your document files. `COleDocument` maintains a linked list of objects, derived from yet another MFC class, `COleClientItem`, which is used to represent individual OLE objects. By default, `COleDocument` can store `COleClientItem` objects to disk and read them back again; all that you typically have to add to it are the code and data needed to manage any native data you're going to support in the application.

In Visual C++ applications, AppWizard will generate a class derived from MFC's `CView` class for managing the display of document data in a window and for interacting with the user who's editing and viewing the document. When you select the OLE container option, AppWizard adds code to the view class to let it display a document's embedded or linked objects—that is, the view class can display OLE items stored in the `COleDocument`'s linked list of `COleClientItem` objects.

But while the AppWizard-generated container provides simple object container services, it has limits. For example, you can't select linked or embedded objects by single-clicking them, or activate their servers by double-clicking them: Only by using an item on the Edit menu can you activate the currently displayed object. And while the program will let you link or embed multiple objects, the code generated by AppWizard allows the display of only one object at a time.

```
class CContrItem : public COleClientItem
{
public:
    CRect m_rect;
    ...
};

BOOL CContrItem::OnChangeItemPosition(const CRect& rectPos)
{
    ASSERT_VALID(this);
    if(!COleClientItem::OnChangeItemPosition(rectPos))
        return FALSE;
}
```

```
InvalidateItem();
m_rect = rectPos;
InvalidateItem();
GetDocument()->SetModifiedFlag();
return TRUE;
}

void CContrItem::OnGetItemPosition(CRect& rPosition)
{
    ASSERT_VALID(this);
    rPosition = m_rect;
}
```



FIGURE 4: The position and size of an embedded or linked item is stored in a `CRect` data member of the container item class and is used in the `OnChangeItemPosition` and `OnGetItemPosition` functions.

```
void CContrView::OnDraw(CDC* pDC)
{
    CContrDoc* pDoc = GetDocument();
    ASSERT_VALID(pDoc);

    POSITION pos = pDoc->GetStartPosition();
    while (pos != NULL)
    {
        // draw the item
        CContrItem* pItem =
```

```
(CContrItem*)pDoc->GetNextItem(pos);
pItem->Draw(pDC, pItem->m_rect);

// draw the tracking rectangle over the item
CRectTracker tracker;

InitTracker(pItem, &tracker);
tracker.Draw(pDC);
}
```

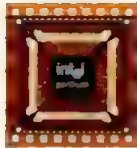


FIGURE 5: The View's `OnDraw` member function gets called whenever the container needs to redisplay the embedded or linked objects, and the loop code swings through the linked list to get each object to redisplay itself.

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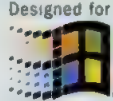
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```
void CCntrView::OnLButtonDown(UINT nFlags, CPoint point)
{
    // We have to add: CheckHitTest...
    CCntrItem* pItem = CheckHitTest(point);
    SelectItem(pItem); // ...and SelectItem...
    if(pItem)
    {
        // ... and SetupTracker
        CRectTracker rectTracker;
        InitTracker(pItem,&rectTracker);
        if(rectTracker.Track(this, point))
    }

    {
        pItem->InvalidateItem();
        pItem->m_rect = rectTracker.m_rect;
        pItem->InvalidateItem();
        GetDocument()->SetModifiedFlag();
    }
    CView::OnLButtonDown(nFlags, point);
}
```



FIGURE 6: The `WM_LBUTTONDOWN` handler, `OnLButtonDown`, responds to left-mouse clicks in a container's view class to draw a selection rectangle around an OLE object and then lets the user move and resize that object.

```
CCntrItem* CCntrView::CheckHitTest(CPoint point)
{
    CCntrDoc* pDoc = GetDocument();
    CCntrItem* pItemHit = NULL;
    POSITION pos = pDoc->GetStartPosition();
    while(pos != NULL)
    {
        CCntrItem* pItem =
            (CCntrItem*)pDoc->GetNextItem(pos);
        if (pItem->m_rect.PtInRect(point))
            pItemHit = pItem;
    }
    return pItemHit; // return top item at point
}
```



FIGURE 7: The View's `CheckHitTest` function identifies the OLE object that includes a particular point on the screen.

```
void CCntrView::SelectItem(CCntrItem* pItem)
{
    // if no item hit, and no item previously
    // selected
    if((pItem == NULL) && (m_pSelection == NULL))
        return;
    // if another item was already selected,
    // close in-place active item
    if(m_pSelection != pItem)
    {
        // retrieve pointer to current item and close it
        COleClientItem* pActive
            = GetDocument()->GetInPlaceActiveItem(this);
        if((pActive != NULL) && (pActive != pItem))
            pActive->Close();

        if((pActive != pItem) && (pItem != NULL))
        {
            GetDocument()->RemoveItem(pItem);
            GetDocument()->AddItem(pItem);
            GetDocument()->SetModifiedFlag();
        }
        if(m_pSelection != NULL)
            OnUpdate(NULL, HINT_UPDATE_ITEM,
                m_pSelection);
        m_pSelection = pItem;
        if(m_pSelection != NULL)
            OnUpdate(NULL, HINT_UPDATE_ITEM,
                m_pSelection);
    }
}
```



FIGURE 8: The `SelectItem` function closes any currently active OLE item, reinserts the newly selected item in the list of OLE objects, and then sets the view's selection pointer to the selected object.

If you insert more than one object, only the last one is displayed; if you save the compound document to disk and then reopen it, the container displays only the first object. Finally, the AppWizard-generated code doesn't query an object—or its server—to obtain the object's size; instead, the program displays the object's metafile image in fixed size and position in the container's windows. Consequently, the objects look distorted when the metafiles are played back. What's needed is the ability to track and maintain the position and size of an embedded or linked object, and to store that information with the object itself.

ADDING FEATURES

You can overcome the limitations of the AppWizard-generated container by modifying its code. To do this, you'll need considerable

familiarity with MFC and the classes it uses to implement the OLE interfaces, and with the associated issues. But that knowledge can go a long way.

For instance, the AppWizard-generated container doesn't maintain the position and size of embedded or linked objects, which would allow them to be moved or resized in a window. To add this feature, you have to add a Windows rectangle object—encapsulated in the MFC `CRect` class—as a data member of the `COleClientItem` derivative generated by AppWizard. Then, this data member—`m_rect`—can be used when MFC and OLE notify the container when the user alters the size and position of an object (in the override of `OnChangeItemPosition`) and can retain this information. This `CRect` data member can also be used to provide the position and size

of the OLE object when the container needs to know it (in the override of `OnGetItemPosition`)(Figure 4).

With the position and size information retained by each OLE object, you can then modify the container's view code to display each of the embedded or linked objects whenever the user positions them. The default AppWizard-generated drawing code displays only the most recently inserted object; AppWizard adds a `COleClientItem`-derivative pointer, `m_pSelection`, to the view class, which uses the pointer in a call to `COleClientItem::Draw` to draw the object's metafile. The drawing operation is encapsulated in the View's `OnDraw` function, which is invoked whenever the container needs to redisplay the window containing the objects. By traversing the linked list maintained by the

```
void CCntrView::OnLButtonDown(UINT nFlags, CPoint point)
{
    if (m_pSelection != NULL)
    {
        m_pSelection->DoVerb(
            (::GetKeyState(VK_CONTROL) < 0 ?
             OLEIVERB_OPEN : OLEIVERB_PRIMARY),
            this);
    }
    CView::OnLButtonDown(nFlags, point);
}
```

FIGURE 9: The WM_LBUTTONDOWN handler lets the user activate an object via its primary OLE command or verb.

COleDocument-derived document class, you can get each object to draw itself instead. Plus, you can use another MFC class, CRectTracker, to create a nicely defined rectangular border around each object and clearly delineate each object where it's displayed (Figure 5). Note that the call to COleClientItem::Draw uses the CRect data member m_rect (described above) that maintains the position and size of the object.

CREATING TRACKING RECTANGLES

CRectTracker was added to MFC to support OLE operations, but it can be used any time you want to:

- Draw a rectangle with specific attributes.
- Provide a rectangular border around some data.
- Let the user interact with, resize, and position such a rectangle.

The code in Figure 5 simply uses a local CRectTracker object to provide a rectangular border. But you can use such objects to do the dirty work of letting the user resize and position an OLE object as well.

For example, CRectTracker::Track will let the user stretch, move, and resize a rectangle and return a value indicating whether the rec-

function via point-and-click. Once you've checked to ensure that a linked or embedded object is being selected, you can initialize the CRectTracker and call the Track member function to let the user move and resize the rectangle drawn around the object. CRectTracker::Track will return nonzero if the rectangle changed while the user was interacting with it, letting you retrieve the new rectangle size and position from the CRectTracker object, and then force the view window to redisplay itself (Figure 6). The two helper functions, CheckHitTest and SelectItem, encapsulate the process of detecting whether an object was selected by the user and then actually selecting that item.

Ensuring that the user really has selected an embedded or linked item can be tricky. It requires that you swing through the linked list of objects stored in the document object and check whether the mouse position (at the time of the left-click) was over each object. But the z-order of the objects displayed on the screen is the order in which they occur in the linked list, with the final object in the list displayed last and on top of the others. So two steps are actually required to figure out which object was selected (if any). First you have to determine whether the mouse position was over

trying to select and move an embedded or linked object in a window.

In MFC, you create an OnLButtonDown handler in your view class to handle WM_LBUTTONDOWN; if you are using Visual C++, you use the ClassWizard component to create and establish your OnLButtonDown

played on top of a previously selected object—was selected instead.

In our sample Visual C++ container, the helper function CheckHitTest encapsulates this process (Figure 7). The function uses the CPoint parameter—passed to the OnLButtonDown handler—to identify the point where the user clicked the left mouse button, and thus to determine which object was selected and return a pointer to that object.

If the left-mouse-button click represents an attempt by the user to select an object for activation, you have to reset the view object's selection pointer, m_pSelection. An additional helper function, SelectItem (Figure 8), ensures that any currently active OLE object is closed, and then selects the object clicked by the user. The function first checks to see if the container is visually editing another object; if so, the other object must be deactivated. Next, it removes the object chosen by the user (in CheckHitTest) from the list maintained by COleDocument and reinserts the object at

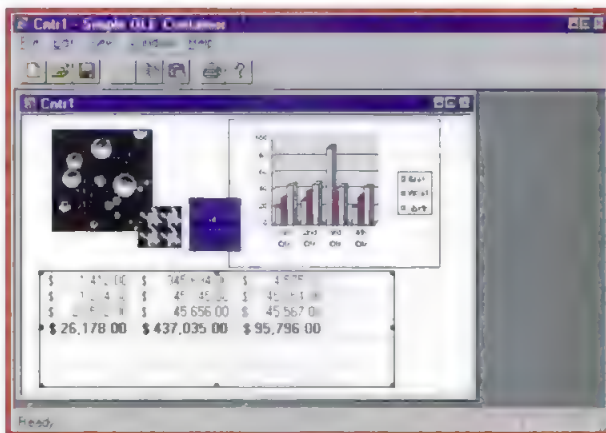


FIGURE 11: The enhanced Visual C++ container application is more interesting, flexible, and robust.

```
void CCntrView::OnEditClear()
{
    if (m_pSelection != NULL) // not really needed
    {
        m_pSelection->Delete();
        m_pSelection = NULL;
        GetDocument()->UpdateAllViews(NULL);
        GetDocument()->SetModifiedFlag();
    }
}
```

FIGURE 10: OnEditClear lets a user delete a selected object via a Delete item in the view's Edit menu.

tangle's position or size changed in the process. So, by intercepting the WM_LBUTTONDOWN message when the user clicks the left mouse button in a window, you can add a rectangle that the user can interact with when

an object (or rather, inside its size/position rectangle) and retain a pointer to that object. Then you have to check the rest of the list of objects, in the event that an object that occurs later in the list—which would be dis-

played on top of a previously selected object—was selected instead.

ACTIVATING AND DELETING AN OBJECT

To activate an object, the container needs a WM_LBUTTONDOWN handler. The handler will use the view's selection pointer, m_pSelection, to invoke the object via COleClientItem::DoVerb and in turn invoke the object's server to activate the object for visual or open editing. The OnLButtonDown handler in Figure 9 demonstrates this.

Finally, AppWizard-generated containers provide no mechanism for letting you delete embedded or linked objects from the container's compound document. But you can add a Delete command to your view's Edit menu and create a command-handler function to delete the selected object, as Figure 10 illustrates.


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The result? A far more interesting, flexible, and robust container application that starts to look more like commercial, off-the-shelf software (Figure 11).

THE BIG PICTURE

Preparing the VB and VC++ programs discussed here posed some interesting problems. First, I was astonished at how many different components had to be packaged with the VB container so it could run on a naked Windows 95 system (that is, a system on which VB 4.0 had not already been installed). For example, the code in Figure 2, along with a couple of VB forms, compiles to a 23K file, OLECONT.EXE. (Visual Basic doesn't offer a compiler per se but a means of creating an executable that will invoke its interpreted language engine to execute the code at runtime.) To run OLECONT, you must have MSVCRT40.DLL (the Microsoft Visual C++ 4.0 runtime DLL) and VB40032.DLL installed; together these files consume more than a megabyte of disk space. To support the OLE container control, you also need OLEPRO32.DLL (72K) and to display the Common File Open dialog, you need an OLE control, COMDLG32.OCX (91K). And for this to run, you need MFC40.DLL, which contains MFC 4.0 and adds another 900K.

In all, the VB application soaks up more than 2MB of disk space. The Visual C++ container (built with VC++ 2.2), on the other hand, requires only 31K. (At the time of this writing, Visual C++ 4.0 had not yet shipped.) While the VC++ container requires MFC30.DLL (316K) and MFCO30.DLL (131K), both are included with Windows 95, so you'll need only CNTR.EXE to try the VC++ container on a Windows 95 system. Even if you recompile with the VC++ 4.0 beta, the distributable files total only about 900K. Both sample programs, along with all the files needed to run them, are contained in the two files BASCONT.ZIP and CPPCONT.ZIP. You can download these files from PC Magazine Online. See the sidebar "Guide to Our Utilities" for instructions.

Of course, with C++ application frameworks such as Visual C++ and the Microsoft Foundation Classes, you need to know more about how to create OLE applications than with Visual Basic. But the performance of C++ executable code is excellent, and C++'s extensibility makes it possible to apply MFC's implementation of OLE to a wide variety of containers and servers. In the next column, we'll discuss how you can use these tools to build clients and servers that use OLE automation: a powerful but distinctly different and developer-centric feature of OLE. □

Richard Hale Shaw is a contributing editor of PC Magazine.

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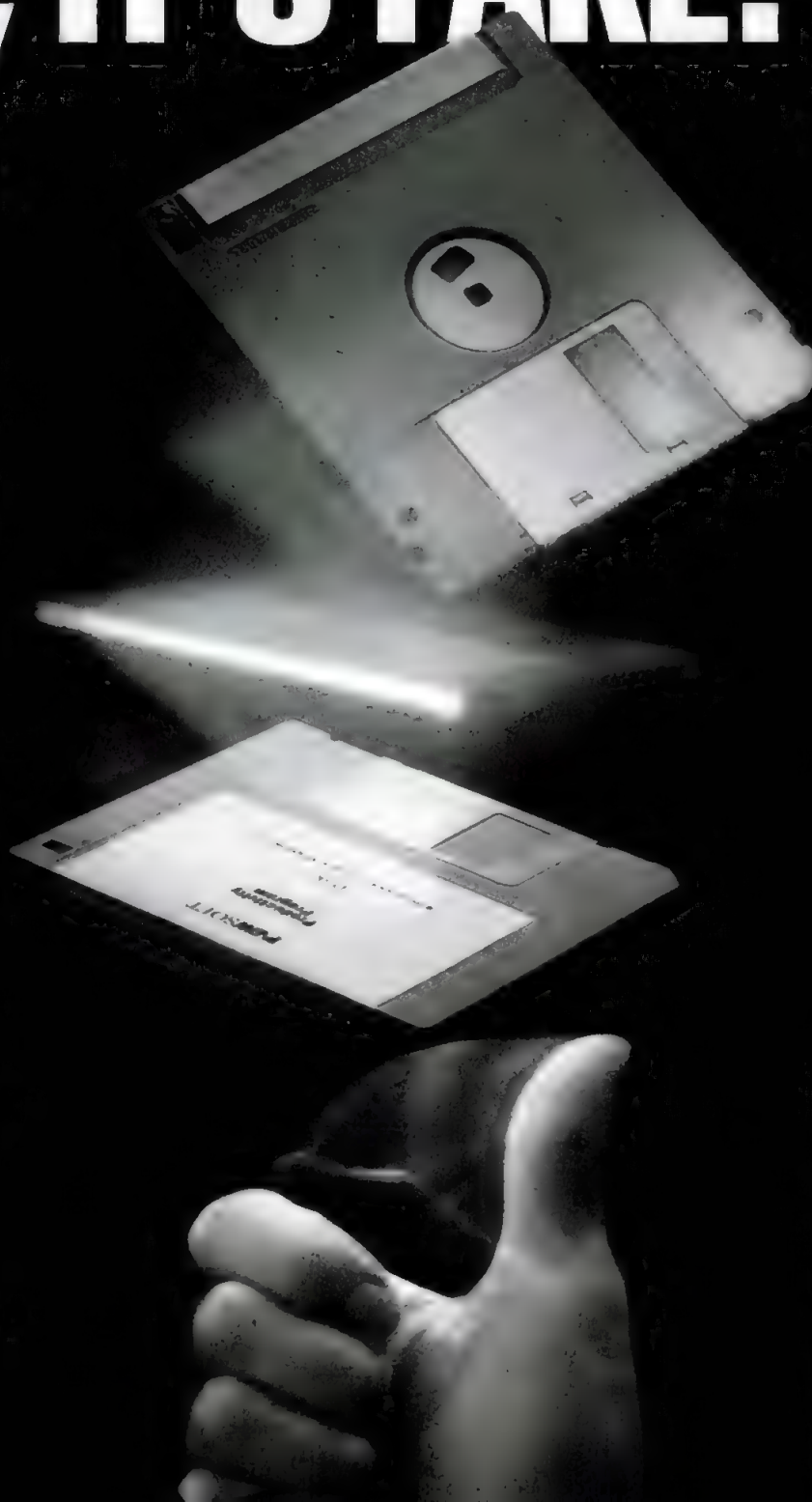
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PC Tech/Utilities

By Jeff Prorise

Turn Zip Files into Drop Targets

ZipDrop extends the Windows 95 shell's drag-and-drop capabilities to include .ZIP files.

Zipping files up with PKZIP is a smart way to keep similar files together and save on disk space needed to store them. And if you take advantage of zipping files up, you probably need to add more files to your .ZIP archives now and then. If you do this under Windows 95, you've probably wondered whether there's a better way than opening up a DOS window, running PKZIP with the -a parameter, and specifying the files you want to add.

Well now there is! This issue's utility, ZipDrop, turns .ZIP files into intelligent drop targets. Want to add a file to a .ZIP file and do it the Windows 95 way? With ZipDrop present to lend a hand, it's easy: Just grab the file with the mouse and drop it over a .ZIP file icon. ZipDrop will sense the drop and call PKZIP to add the file to the archive.

Now you can use the ZipView utility, featured in our Utilities column of December 5, 1995, hand in hand with ZipDrop. ZipView enhanced the Windows 95 user interface by adding a Contents page to any property sheet displayed for a .ZIP file.

ZipDrop is a powerful addition to Windows 95 that extends the shell's drag-and-drop capabilities to include .ZIP files. It requires both Windows 95 and a licensed copy of PKZIP. You can obtain ZipDrop from PC Magazine Online or by mail (see the sidebar "Guide to Our Utilities").

INSTALLING ZIPDROP

To install ZipDrop, use the special setup program ZDSetup.exe that you downloaded along with ZipDrop.dll. Shell extensions don't work until they're properly registered in the Windows 95 Registry. Registration involves writing a series of specially formatted entries to the Registry and making sure the added entries don't conflict with existing ones. Among other things, the registration data tells Windows what drive and directory ZipDrop.dll is in, what types of files it's designed to work with, and what kinds of services it provides.

To install ZipDrop and get it ready to run, follow this simple procedure:

1. Copy ZipDrop.dll to the hard disk directory of your choice. If at some later time you de-

cide to move the DLL, run ZDSetup again to inform Windows of the new location.

2. Run ZDSetup, enter the path to ZipDrop.dll in the "Enter ZipDrop Path" dialog box, and click OK. If ZipDrop.dll is stored in the same directory as the setup program, the pathname will be filled in for you. If ZipDrop.dll is stored elsewhere, you'll need to fill in the pathname yourself.

IN THIS ISSUE

ZipDrop

ZipDrop is an extension to the Windows 95 shell that makes it easier to work with .ZIP files. It allows you to add files to a .ZIP archive by simply dragging them over to the .ZIP archive icon and dropping them in.



You can use the Browse button to hunt down ZipDrop.dll. The default behavior for Explorer, however, is to hide certain system files, including DLLs. If you don't see any DLLs, launch Explorer, select View | Options from the menu, and click on the "Show all files" box.

After a brief pause, ZDSetup will inform you that setup is complete. The only error message you're even remotely likely to receive is "Setup failed because REGEDIT.EXE could not be found on your PC." Rather than modify the Registry directly, ZDSetup creates a temporary text file containing Registry-editing commands and invokes the RegEdit utility supplied with Windows 95 to do the actual editing. If the setup program complains that it couldn't find RegEdit, find Regedit.exe on your hard disk and copy it to the Windows directory. Then run ZDSetup again and installation should proceed smoothly.

If you grow tired of dragging and dropping and decide to discard ZipDrop, uninstalling it

is as simple as deleting ZipDrop.dll, moving it to another directory, or just renaming it. If you've used ZipDrop in the past 10 or 15 minutes, the shell may prevent you from deleting, moving, or renaming the file because the file is still in use. The shell does this for performance reasons so it won't have to continually load and unload a frequently used DLL. You can release the shell's lock on the file by waiting a few minutes or by restarting Windows.

Doing away with the DLL does nothing to remove the entries that the setup program added to the Registry, but they cause no performance hit and consume next to no disk space. Still, if they bother you, remove the ZipDrop Registry entries using RegEdit. A word of caution: RegEdit can get you in trouble if you don't know what you're doing. Better to leave the remnants of ZipDrop behind than risk deleting Registry entries that shouldn't be deleted. If you're knowledgeable enough about shell extensions to know how they're registered, then you're competent to use RegEdit, too.

Tip: If you'd like to see a list of the entries ZDSetup adds to the Registry to aid in the uninstall process, press the Ctrl key and hold it down for a few seconds before clicking OK in the "Enter ZipDrop Path" dialog. This prevents the setup program from deleting the registration file. Unless the path to the temporary directory has been modified on your PC, you'll find the file in the TEMP subdirectory of the Windows directory. The filename will vary, but it will start with the letters REG and have a .TMP extension—for example, REG03A4.TMP. You can do this even after you install ZipDrop by running ZDSetup again.

PUTTING ZIPDROP TO WORK

Once ZipDrop is installed, you're ready to start zipping files. To demonstrate how ZipDrop works, open My Computer or Explorer to a folder that contains a .ZIP file and drag it out to the desktop for easy access. Then go to a folder containing a few files you'd like to add to the .ZIP file. Now select a file, use the left mouse button to drag it to the .ZIP file icon that you placed on the desktop, and let go of the mouse button when the pointer is over the icon. A DOS window will briefly pop up while PKZIP does its thing and the file that you dropped will be added to the .ZIP file.

If you get a message box complaining that ZipDrop couldn't find PKZIP, copy Pkzip.exe to a directory in the PATH and try again. (If you're unsure what directories are in the PATH, open a DOS window and type PATH at

the command prompt.) ZipDrop saves you the trouble of having to enter the path to PKZIP by searching for it in the Windows directory and all directories in your path. But it's up to you, of course, to make sure that PKZIP is in the path.

If the DOS window in which PKZIP runs doesn't disappear when PKZIP is done, click the close button (the X in the window's upper-right corner), go to the folder that contains Pkzip.exe, and right-click the PKZIP icon. Select Properties from the ensuing context menu and click the property sheet's Program tab.

Then check the "Close on exit" box near the bottom of the property sheet page and click OK to dismiss the property sheet. In the future, the DOS window will disappear automatically the moment PKZIP is done.

When you drag-and-drop a file to a .ZIP file icon without holding down the Ctrl key, the file is "moved" into the .ZIP file. In other words, it's zipped up, added to the archive, and then deleted from its original location. To copy a file to the archive rather than move it, hold down the Ctrl key while performing the drop. The small plus sign that appears next to the mouse pointer means the file you're dragging will be copied; no plus sign means the file will be moved. Note that files marked with read-only attributes will not be deleted, even if they're dropped without the Ctrl key.

You don't have to drop files on the .ZIP file icon one at a time; you can select as many as you like and drop them all at once. You can select groups of files by clicking each one after the first with the Ctrl key held down or by dragging a selection rectangle around the files you want to grab.

You can zip an entire directory full of files by dragging a folder to the .ZIP file icon. Remember to hold down the Ctrl key if you don't want the folder to be deleted after its contents are zipped. Unless a folder contains subfolders that prevent it from being deleted, PKZIP will automatically delete the folder if it is dropped without the Ctrl key. This behavior applies to PKZIP 2.04 and later and may differ if you use an older version of PKZIP.

By default, dropping a folder onto a .ZIP file icon zips only the contents of that folder. If the folder contains subfolders, the files in the subfolders are not added to the archive. If you want to zip the contents of the subfolders as well, drag-and-drop with the right mouse button instead of the left. When the drop occurs, ZipDrop will display the Options dialog box shown in Figure 1.

Click the "Zip subdirectories, too" box to

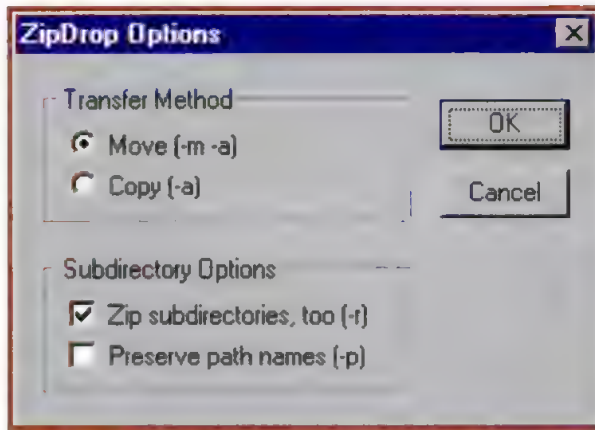


FIGURE 1: When you drag-and-drop files with the right mouse button, you get an Options dialog box that lets you include subdirectories in the .ZIP file.

zip subfolders and click "Preserve path names" if you want the paths to the files in the subfolders to be preserved in the .ZIP file. Checking "Zip subdirectories, too" is equivalent to running PKZIP with a -r switch, and "Preserve path names" adds a -p switch. If you're unfamiliar with the operation of these switches, refer to the documentation accompanying PKZIP for further information. Be aware that moving a folder with the "Zip subdirectories, too" option enabled will delete that folder from its original location, even if it contains subfolders.

The Options dialog also lets you decide whether to perform a move or copy independently of the Ctrl key's up/down state. Just click the Move radio button to perform a move or Copy to copy. If you would like to select Move or Copy from a dialog every time rather than use the Ctrl key, use the right mouse button for all your drops. If the operation doesn't involve a folder, the "Zip subdirectories, too" and "Preserve path names" boxes will be disabled.

HOW ZIPDROP WORKS

If you're a programmer, you may be interested in learning how ZipDrop works its magic. ZipDrop is a Windows 95 shell extension that integrates itself with the shell using documented interfaces derived from the Component Object Model (COM) upon which OLE is based. Windows 95 supports seven different types of shell extensions ranging from context menu han-

dlers (shell extensions that add items to right-click context menus) to property sheet handlers like my ZipView utility. ZipDrop is a drop handler shell extension. As far as I know, it's the only drop handler shell extension available that comes with source code. Even Microsoft's own SDK examples do not include this type of handler.

A drop handler is a shell extension that turns shell objects into intelligent drop targets. When a drop handler is registered for .ZIP files, and a file, folder, or other object is dragged over a .ZIP file icon, the drop handler is awakened and notified that a drop may be about to occur. While the mouse pointer is over the .ZIP file icon, the drop handler provides feedback to the shell indicating what will happen if a drop occurs so the shell can provide visual feedback to the user. If a drop occurs, the drop handler can query the system to retrieve the name of the dropped file (or files). Once the filename is in hand, it's a simple matter to invoke PKZIP and let it do the zipping.

Much of the code that goes into a shell extension is common to all types of shell extensions and has been discussed before in this magazine and elsewhere. (For more on the basics of writing a shell-extension DLL, refer to the "Further Reading" section.) Thus I will concentrate only on the components of ZipDrop that are unique to drop handlers.

What differentiates one type of shell extension from another is the OLE interfaces they support. All shell extensions support the IUnknown interface common to all COM-style component objects, and all shell extensions

except for copy-hook handlers support either the IShellExtInit interface or the IPersistFile interface. Drop handlers use IPersistFile; specifically, they receive the name of the file whose icon serves as the drop target through the IPersistFile::Load method.

A method is a function that is a member of an interface, and it is conceptually similar to a member function in a C++ class. Drop handlers also use the IDropTarget interface, which is one of the simpler OLE inter-

faces to implement. IDropTarget contains just four methods: DragEnter, DragOver, DragLeave, and Drop. If you understand the implementations of these functions in ZipDrop.cpp, you're 90 percent of the way to understanding how ZipDrop works.

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Let's start with `CShellExtension::Load`, which is `ZipDrop`'s implementation of `IPersistFile::Load`. `CShellExtension` is the C++ class that represents the shell extension object the DLL creates when the shell requests it. It is publicly derived from `IDropTarget` and `IPersistFile` in `ZipDrop.h` and provides its own implementations of these classes' member functions. Thus, `CShellExtension::Load` is `ZipDrop`'s implementation of `IPersistFile::Load`, `CShellExtension::Drop` is `ZipDrop`'s implementation of `IDropTarget::Drop`, and so on.

When you drag a file, folder, or other object that exposes its data through an `IDataObject` interface over an icon for a file for which a drop-handler shell extension is registered, Windows 95 loads the drop handler DLL, creates a drop-handler shell extension object, and calls that object's `IPersistFile::Load` function with the name of the file

that serves as the drop target. When a file is dragged over a .ZIP file, `ZipDrop`'s `Load` function converts the .ZIP file name from Unicode to ANSI and stores the result in `CShellExtension`'s `m_szFile` data member. (File names passed to `IPersistFile::Load` come in Unicode format. But because Windows 95, unlike Windows NT, uses ANSI character strings, the filename must be converted before it can be used.) Later, if a drop occurs, the .ZIP file name is included in the command line that invokes `PKZIP`.

An application can lend `IDataObject` support to its document icons by supplying another type of shell extension known as a data handler. But the shell provides a default `IDataObject` interface for file and folder objects, one that renders data in `CF_HDROP` format listing file and folder names. Therefore, any file or folder viewed in the shell's namespace (in My Computer on the desktop or in

an Explorer window) can serve as a drop source.

The shell's next action after calling the `IPersistFile::Load` is to call the drop handler's `IDropTarget::DragEnter` function (see Figure 2). `DragEnter` notifies the drop handler that a dragged object has just entered its domain. It is prototyped as follows:

```
IDropTarget::DragEnter (IDataObject*
pDataObj, DWORD grfKeyState, POINTL
pt, DWORD* pdwEffect)
```

`pDataObj` is a pointer to the object's `IDataObject` interface; `grfKeyState` contains bit flags identifying the state of the Ctrl, Alt, and Shift keys and the mouse buttons; `pt` contains the current cursor position in coordinates local to the drop target; and `pdwEffect` is a pointer to a `DWORD` that receives information informing the shell what effect,

```
STDMETHODIMP CShellExtension::DragEnter (IDataObject*
pDataObj, DWORD grfKeyState, POINTL pt, DWORD*
pdwEffect)
{
    static FORMATETC fe = { CF_HDROP, NULL,
DVASPECT_CONTENT, -1, TYMED_HGLOBAL };

    HRESULT hr = pDataObj->QueryGetData (&fe);

    if (FAILED (hr)) {
        m_bFormatSupported = FALSE;
        *pdwEffect = DROPEFFECT_NONE;
    }
    else {
        m_bFormatSupported = TRUE;
        *pdwEffect = (grfKeyState & MK_CONTROL) ?
DROPEFFECT_COPY : DROPEFFECT_MOVE;
    }
    m_bRightDrag = grfKeyState & MK_RBUTTON;
    return NOERROR;
}

STDMETHODIMP CShellExtension::DragOver (DWORD
grfKeyState, POINTL pt, DWORD* pdwEffect)
{
    if (m_bFormatSupported)
        *pdwEffect = (grfKeyState & MK_CONTROL) ?
DROPEFFECT_COPY : DROPEFFECT_MOVE;
    else
        *pdwEffect = DROPEFFECT_NONE;

    m_bRightDrag = grfKeyState & MK_RBUTTON;
    return NOERROR;
}

STDMETHODIMP CShellExtension::DragLeave ()
{
    return NOERROR;
}
```

```
STDMETHODIMP CShellExtension::Drop (IDataObject*
pDataObj, DWORD grfKeyState, POINTL pt, DWORD*
pdwEffect)
{
    static FORMATETC fe = { CF_HDROP, NULL,
DVASPECT_CONTENT, -1, TYMED_HGLOBAL };

    //
    // Ask the drop source to render the data in CF_HDROP
    // format.
    //
    STGMEDIUM medium;
    HRESULT hr = pDataObj->GetData (&fe, &medium);

    if (FAILED (hr)) {
        *pdwEffect = DROPEFFECT_NONE;
        return E_FAIL;
    }

    //
    // Add the files to the archive.
    //
    *pdwEffect = (grfKeyState & MK_CONTROL) ?
DROPEFFECT_COPY : DROPEFFECT_MOVE;
    hr = NOERROR;

    if (!ZipFiles (&medium, grfKeyState & MK_CONTROL,
m_bRightDrag)) {
        *pdwEffect = DROPEFFECT_NONE;
        hr = E_FAIL;
    }

    //
    // Release the storage medium and we're done.
    //
    ReleaseStgMedium (&medium);
    return hr;
}
```



FIGURE 2: Shown here is `ZipDrop`'s implementation of the `IDropTarget` interface.

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if any, a drop will have at the location identified by pt.

DragEnter's primary job is to set *pdwEffect to DROPEFFECT_NONE, DROPEFFECT_MOVE, or DROPEFFECT_COPY so the shell can set the cursor accordingly. Setting *pdwEffect to DROPEFFECT_COPY, for example, causes the shell to display a small plus sign indicating that dropped objects will be copied rather than moved. ZipDrop's im-

plementation of DragEnter calls IDataObject::QueryGetData through the pointer in pDataObj to verify that the object being dragged supports the CF_HDROP data format; it then sets *pdwEffect to DROPEFFECT_MOVE or DROPEFFECT_COPY depending on the state of the Ctrl key. If the object doesn't support CF_HDROP, *pdwEffect is set to DROPEFFECT_NONE to inform the shell that the drop handler will not ac-

cept a drop. DragEnter also sets a flag named m_bRightDrag to zero or nonzero to indicate whether dragging is being performed with the right mouse button. It's too late to check the mouse-button flags when the drop notification comes, because the left and right mouse buttons are already up by that time.

After IDropTarget::DragEnter come successive calls to IDropTarget::DragOver noti-

```

BOOL CShellExtension::ZipFiles (STGMEDIUM* pMedium, BOOL
bCopy, BOOL bPrompt)
{
    char szCmdLine[(MAX_PATH * 2) + 32];
    char szTempFile[MAX_PATH], szTempPath[MAX_PATH];
    static char crlf[2] = { 0x0D, 0x0A };
    //
    // Get a count of files to be added to the archive.
    //
    UINT nFiles = DragQueryFile ((HDROP) pMedium->hGlobal, (UINT) -1, NULL, 0);

    if (nFiles == 0)
        return FALSE;
    //
    // Create a list file containing the file names.
    //
    GetTempPath (sizeof (szTempPath), szTempPath);
    GetTempFileName (szTempPath, "LST", 0, szTempFile);
    GetShortPathName (szTempFile, szTempFile, sizeof
(szTempFile));
    HANDLE hFile = CreateFile (szTempFile, GENERIC_WRITE,
0, NULL, CREATE_ALWAYS, FILE_ATTRIBUTE_NORMAL, NULL);
    if (hFile == INVALID_HANDLE_VALUE)
        return FALSE;
    DWORD dwBytesWritten;
    char szFile[MAX_PATH];
    g_bFolder = FALSE;
    for (UINT i=0; i<nFiles; i++) {
        DragQueryFile ((HDROP) pMedium->hGlobal, i,
szFile, sizeof (szFile));
        GetShortPathName (szFile, szFile, sizeof
(szFile));
        if (GetFileAttributes (szFile) &
FILE_ATTRIBUTE_DIRECTORY) {
            lstrcat (szFile, "\\*.");
            g_bFolder = TRUE;
        }
        WriteFile (hFile, szFile, lstrlen (szFile),
&dwBytesWritten, NULL);
        WriteFile (hFile, crlf, 2, &dwBytesWritten,
NULL);
    }
    CloseHandle (hFile);
    //
    // Formulate a "PKZIP -a -whs [-m] [-r] [-p] zipfile
// @listfile" command.
    //
    lstrcpy (szCmdLine, "pkzip -a -whs ");
    if (!bPrompt) {
        if (!bCopy)

```

```

        lstrcat (szCmdLine, "-m ");
    }
    else {
        g_bCopy = bCopy;
        if (IDialogBox (g_hInstance, "Options", NULL,
(DLGPROC) OptionsProc)) {
            DeleteFile (szTempFile);
            return FALSE;
        }
        if (!g_bCopy)
            lstrcat (szCmdLine, "-m ");
        if (g_bFolder) {
            if (g_bRecurse) {
                lstrcat (szCmdLine, "-r ");
                if (g_bPreservePath)
                    lstrcat (szCmdLine, "-p ");
            }
        }
        lstrcat (szCmdLine, m_szFile);
        lstrcat (szCmdLine, " @");
        lstrcat (szCmdLine, szTempFile);
        //
        // Execute the PKZIP command.
        //
        STARTUPINFO si;
        ZeroMemory (&si, sizeof (STARTUPINFO));
        si.cb = sizeof (STARTUPINFO);
        PROCESS_INFORMATION pi;
        BOOL bReturn = TRUE;
        if (CreateProcess (NULL, szCmdLine, NULL, NULL,
FALSE, 0, NULL, NULL, &si, &pi)) {
            WaitForSingleObject (pi.hProcess, INFINITE);
            CloseHandle (pi.hProcess);
            CloseHandle (pi.hThread);
        }
        else {
            MessageBox (NULL, "Unable to launch PKZIP. Make
sure PKZIP.EXE " \ "is in a PATHed directory and
try again.", "Error",
MB_ICONINFORMATION | MB_OK);
            bReturn = FALSE;
        }
        //
        // Clean up and exit.
        //
        DeleteFile (szTempFile);
        return bReturn;
    }
}

```

FIGURE 3: The CShellExtension::ZipFiles function is where the actual file-zipping is done.



fyng the drop handler of cursor locations as the drop source moves over the drop target. If the source leaves the target area, the handler's IDropTarget::DragLeave function is called. Until then, or until a drop occurs, IDropTarget::DragOver is called repeatedly. The function is prototyped as follows:

```
IDropTarget::DragOver (DWORD  
grfKeyState, POINTL pt, DWORD*  
pdwEffect)
```

The parameters have the same meaning as those for DragEnter. DragOver's job is to copy the appropriate DROPEFFECT code to *pdwEffect, just like DragEnter. ZipDrop doesn't care where the cursor is located (just that it's somewhere over the drop target), so its DragOver handler simply sets *pdwEffect to DROPEFFECT_MOVE if the Ctrl key is up, DROPEFFECT_COPY if it's down, or DROPEFFECT_NONE if the object's IDataObject interface doesn't support the CF_HDROP format.

Rather than call IDataObject::QueryGetData to check for CF_HDROP support as DragEnter does, DragOver simply checks the value of CShellExtension::m_bFormatSupported. This data member's value is initialized by DragEnter; it is TRUE if QueryGetData answered yes and FALSE if it answered no.

Checking a variable value rather than calling QueryGetData allows DragEnter calls to be processed more quickly and keeps the user interface crisp and responsive. DragOver also sets m_bRightDrag to a zero or nonzero value just like DragEnter to record the most recent state of the right mouse button.

If and when a drop occurs over the drop target, the drop handler's IDropTarget::Drop function is called. Here's the function prototype, which should look pretty familiar to you by now:

```
IDropTarget::Drop (IDataObject*  
pDataObj, DWORD grfKeyState, POINTL  
pt, DWORD* pdwEffect)
```

This is where the real action occurs. ZipDrop's Drop handler begins by calling IDataObject::GetData through the pDataObj pointer to render the data in CF_HDROP format. The result is a "storage medium" (actually a block of memory) containing the names of the files and folders involved in the drop. Drop then calls CShellExtension::ZipFiles with a pointer to the memory block, a flag indicating whether the files should be copied or moved, and a flag indicating whether the right mouse button was down just before the drop (and therefore whether the Options dialog should be displayed). ZipFiles, in turn,

extracts the file and folder names from the memory block using the Win32 DragQueryFile function and invokes PKZIP to add the files and folders to the archive.

After the files are zipped, ZipFiles returns and Drop returns, too, notifying the shell that the drop operation is complete. The value returned by Drop is either NOERROR, indicating that the drop was executed successfully, or E_FAIL, indicating that an error occurred. This value is keyed to the value returned by ZipFiles, which returns TRUE or FALSE to indicate success or failure.

That's the crux of how ZipDrop works; the rest is just detail. If you'd like to see how the zipping is done, check out the CShellExtension::ZipFiles function reproduced in Figure 3. The basic procedure goes like this:

1. Use the Win32 GetTempPath, GetTempFileName, and CreateFile functions to create a temporary file in the directory designated for temporary files.
2. Extract filenames one by one from the CF_HDROP-formatted memory block, use the GetShortPathName API function to convert each filename to short form with a fully qualified pathname, and write the resultant names to the temporary file. If the filename is actually a folder name, append "\.*" so that everything in the directory will be zipped. Using short names rather than long

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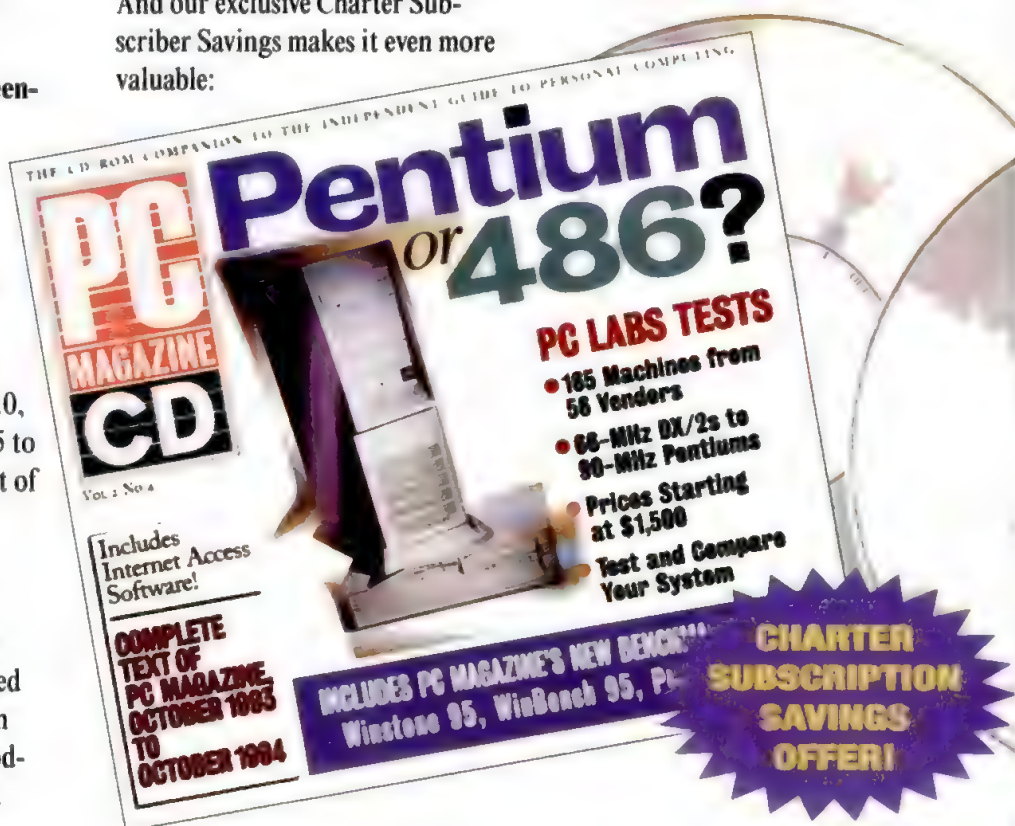
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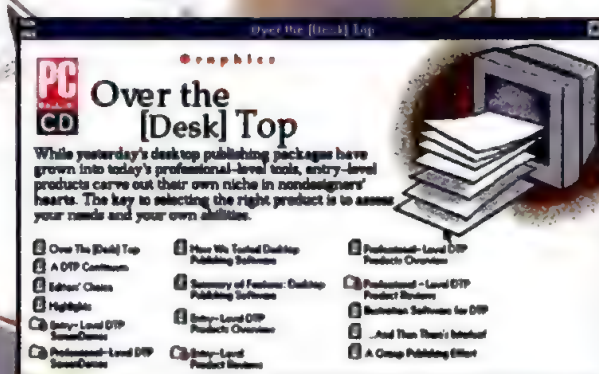
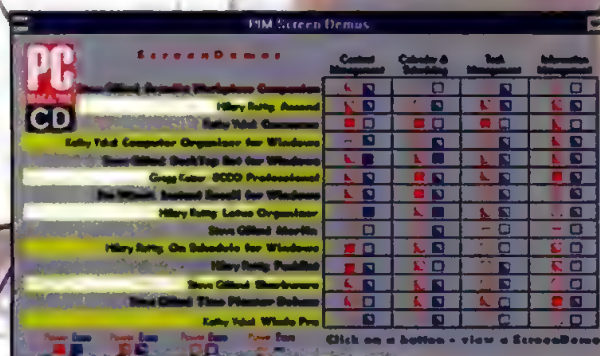
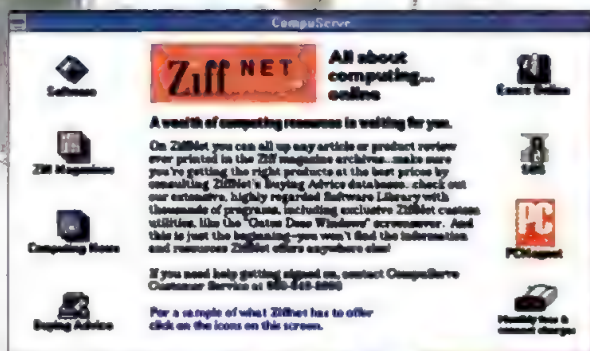
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names is necessary because PKZIP is an MS-DOS app that doesn't understand long filenames.

3. Use the Win32 CreateProcess function to execute a

```
pkzip -a -whs [-m] [-r] [-p] zipfile  
-@listfile
```

command; *zipfile* is the filename stored in *m_szFile*, *listfile* is the name of the temporary file containing the names of the files and folders to zip, and the -m (for *move*) switch is included only if the Ctrl key is not held down. If the drop was performed with the right mouse button, display the Options dialog to determine which switches should be included.

4. Use WaitForSingleObject to wait until PKZIP has run its course and then finish up by deleting the temporary file. Waiting is essential, because Win32 processes are

launched asynchronously. If the temporary file is deleted as soon as CreateProcess returns, it will probably be deleted before PKZIP is through with it.

One of the benefits of using CreateProcess to launch an application is that it automatically searches directories in the PATH for the executable file. Therefore, ZipFiles doesn't have to specify a path to Pkzip.exe. It simply provides the filename, and the operating system does the legwork.

ZipDrop and its companion utility, ZipView, show just how extensible the Windows 95 user interface is. And they add a new capability to the shell, enabling ordinary .ZIP files to act as intelligent file-system objects. If you can think of other useful and interesting shell extensions you'd like to see written for Windows 95, e-mail me at 72241.44@compuserve.com. I'll collect your suggestions and look forward to implementing some of them in future columns.

FURTHER READING

Some suggestions if you're interested in learning more about Windows 95 shell extensions:

- *Inside OLE*, Second Edition, by Kraig Brockshmidt. Chapter 13, "OLE Drag and Drop." Redmond, WA: Microsoft Press, 1995.
- "Integrate Your Applications with the Windows 95 User Interface Using Shell Extensions," by Jeff Prosise. *Microsoft Systems Journal*, March 1995.
- *Programming the Windows 95 User Interface*, by Nancy Winnick Cluts. Chapter 13, "User Interface Extensions." Redmond, WA: Microsoft Press, 1995.
- "Unzipping Files the Windows 95 Way," by Jeff Prosise. *PC Magazine*, December 19, 1995. □

Jeff Prosise is a contributing editor of PC Magazine. His new book, Programming Windows 95 with MFC, is scheduled to be published this winter by Microsoft Press.

GUIDE TO OUR UTILITIES

ABOUT ZIPDROP...

DESCRIPTION ZipDrop is an extension to the Windows 95 shell that makes it easier to work with .ZIP files. It allows you to add files to a .ZIP archive by simply dragging them over to the .ZIP archive icon and dropping them in.

USAGE To install ZipDrop, copy ZIPDROP.DLL to a directory on your hard disk and run ZDSetup. This adds lines to your Registry that tell Windows 95 how and when to use ZIPDROP.DLL.

ZDSetup will ask you for the path of ZIPDROP.DLL. You can type the pathname manually or use the Browse button to search for the file. Note that ZIPDROP.DLL won't show up in the Browse window if "Hide files of these types" is checked in the View page of the Options dialog box that pops up when you select View | Options in an Explorer window.

ZipDrop can be used with file icons in the My Computer folder or Explorer. Find the .ZIP file you want and drag it out to the desktop for easy access. Then find the files you'd like to add to the .ZIP file and select them. If you drag the files with the left mouse button and drop them on the .ZIP file, they will be added to the .ZIP file and deleted from their former locations. If you hold down the Ctrl key while dragging, the files will be copied rather than moved.

By default, dropping a folder on a .ZIP file icon zips only the contents of that folder. If you'd like to zip the contents of the subfolders as well, do your dragging and dropping with the right mouse button instead of the left. An Options dialog box will appear that lets you choose to zip subdirectories, too and preserve pathnames. It also lets you decide whether to perform a move or copy independently of the up/down state of the Ctrl key.

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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Fast Selection in File Manager

I have discovered an interesting pair of keyboard shortcuts for Windows' File Manager that are not mentioned (to my knowledge) in the on-line help. First, press Tab or click with the mouse to move the focus to the file pane. Now, press the Slash key (/) to select all the files in the directory. To unselect all but the current file, press Backslash (\).

ADAM NOLLEY, Amherst, Virginia

PC MAGAZINE: I've used Windows for years without ever running across these handy shortcut keys! I flipped through a half-dozen Windows books without finding any mention of them. Poring through the Microsoft Developers Network CD-ROM didn't turn up any references, either. Since they're not in the Help, you'll just have to remember them, though it may be tough remembering which is which. Think of Backslash as putting things back the way they were, with just one file selected.

Another handy shortcut for keyboard enthusiasts is Shift-F8, which puts the file list into Add mode. In this mode, the arrow keys move a hollow-dotted selection rectangle through the list; pressing Spacebar toggles the selection state of the current item. Add mode is great for stepping through a list of files and selecting a smattering of them. The alternative is scrolling through the list with the mouse and using Ctrl-click to make individual selections. If you accidentally click on a file without pressing Ctrl, all your previous selections disappear! Add mode ends when you tab to another control or click with the mouse. Most multiple-choice lists in Windows 3.1 support Add mode. Alas, there appears to be no equivalent in Windows 95.

Dual Windows Without Dual Boot

I've been using Microsoft Windows 95 for several months now and have experienced frustration over compatibility problems. I use several older Windows programs that don't run with complete success under Windows 95. Some people would solve the problem with a dual-boot setup and run the old programs

under Windows 3.1. My solution is probably just as complex to set up, but it takes advantage of Windows 95's strengths.

The first step is to shut down and restart the system in MS-DOS mode and use the Windows 3.1 SETUP program to install a copy of Windows 3.1 in its own directory. If Windows 95 resides in the C:\WINDOWS directory, put Windows 3.1 in C:\WIN31, for example. During setup, choose Custom Setup and omit non-essential components such as wallpaper, README files, and accessories. This will save both installation time and disk space.

You now have a no-frills version of Windows 3.1 that's perfect for running uncooperative programs. Install the programs you want to run under Windows 3.1, so they can make any necessary changes to the .INI files and copy DLLs to your hard disk. Next, start Windows 95 and create a shortcut to Windows 3.1. Be sure to configure it to run in MS-DOS mode in the Properties dialog; otherwise it will not run.

When you run the shortcut, you'll exit Windows 95 and Windows 3.1 will run in MS-DOS mode. And when Windows 3.1 terminates, Windows 95 will reload. You won't be able to cut and paste between applications running under Windows 3.1 and Windows 95, but your old programs will function as they were designed to.

NIK ANDERSON, Sequim, Washington

PC MAGAZINE: It's happening all over the country: Windows users, whether because of disk space shortage or a too-trusting nature, are allowing the Windows 95 setup program to completely replace Windows 3.x. Most of the time that's fine, but occasionally a mission-critical Windows 3.x program refuses to run under Windows 95. When that happens, you can uninstall Windows 95 (assuming you selected the Setup option to permit uninstallation), reinstall it for dual boot, and migrate your Windows 3.x applications by hand into the Windows 95 start menu. Or you can use the above technique for fast access to Windows 3.x from Windows 95. I'm using it myself; it's decidedly faster than restarting the computer.

Be very careful when reinstalling old Windows versions, as a mistake could overwrite your Windows 95 configuration or cause you to waste disk space. You must choose Custom Setup, and when SETUP suggests "upgrading" your Windows 95 installation to Windows 3.x,

HIGHLIGHTS



HARDWARE Pop your CD-ROM tray open via one of several software utilities; getting a nonstandard monitor to work. Page 242



WORD PROCESSING If you share a computer, you may not want others to see what files you last edited. Here's a way to disable Ami Pro 3.1's most-recent-files list. Page 254



DATABASES You can customize your Access title bar caption and opening screens, even if you don't have the developer's toolkit. Page 258

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PC DIRECT starts here with exciting offers from top direct vendors. See index, page 242

be absolutely certain to install it in a new directory instead. Later in the process, SETUP will present you with a dialog box containing three check boxes that determine what gets installed. Check the box that tells SETUP to install only the components you select. Don't check the box that tells SETUP to install applications it finds on the hard disk. And check the setup printers box only if you intend to print from your old programs.

Since Windows 95 is now your primary operating system, you can dispense with all the optional components. You've got newer, better versions of all the accessories, and you really don't need the Windows 3.x wallpapers, screen savers, and so on. Note that a minimal installation of Windows for Workgroups will still use nearly 10MB of disk space, even without any of the optional items. When SETUP offers to change your AUTOEXEC.BAT and CONFIG.SYS for you, answer with a resounding NO.

That's it! When you've finished installing your old programs, exit Windows 3.x and type EXIT at the DOS prompt to return to Windows 95. Drag WIN.COM from the Explorer to the desktop to create a shortcut, right-click on the new shortcut, and choose Properties from the menu. Click on the Program tab and check the "Close on exit" check box. Then press the Advanced button and check the "MS-DOS mode" box. Now try the shortcut. It should shut down Windows 95 (after warning you) and run Windows 3.x. On exiting from Windows 3.x, you should automatically return to Windows 95.

If you were more prudent and told Windows 95's setup program to leave your old Windows installation in place, this tip can still give you faster access to Windows 3.x than dual-booting would. Just drag your existing WIN.COM from Explorer to the desktop and configure the shortcut as described above.

There's one more step you may want to take if you have several old programs that must run under Windows 3.x. For each of the old programs, hold down Ctrl while you drag the existing shortcut to the desktop to make a copy. Right-click on the copy and again choose the Programs page in the Properties dialog box. Add the full pathname of the old program to the Cmd Line edit box—C:\WIN31\WIN.COM C:\FOO\FOO.EXE, for example. Close the dialog box, then click on the shortcut's name and click again after a brief pause (in other words, execute two clicks as opposed to a double-click). You can now edit the name of the shortcut to reflect the old program it runs.

Protecting Program Manager Settings

Every time you start Windows 3.1, WIN.COM calls WINSTART.BAT. You can use this fact to protect Program Manager settings from others who may use your computer.

My WINSTART.BAT file (Figure 1) first removes all Program Manager restrictions from the PROGMAN.INI file, then checks whether the value of the environment variable PSET is "password" (replace this with your actual password). If this is the case, WINSTART simply exits with no further actions before Windows loads. If not, an unauthorized user may be trying to access the system, so WINSTART appends restriction codes to PROGMAN.INI to prevent the intruder from messing around with the environment.

To prevent WINSTART.BAT itself from being "cracked," move it from the Windows directory to another directory on your path. Windows will find the batch file anyway, but it will be harder for others to find. You can make WINSTART even more difficult to locate by turning it into a hidden file, using the command

```
attrib +h winstart.bat
```

With all this set, Program Manager is effectively locked any time Windows starts. To unlock Program Manager, type

```
SET PSET=password
```

before starting Windows. And when you'll be away from your system, exit Windows and type

```
SET PSET=
```

to lock it again. You can change your password at any time by editing WINSTART.BAT.

With this technique, unauthorized users won't be able to change your group or item properties (Description, Icon, Command line, Working Directory, and Shortcut keys), nor will they be able to copy, move, or delete items or groups. And since the Save Settings on Exit menu choice is disabled, any changes made to Program Manager's main window or group windows won't be permanent. Although simple, this method has proven effective: It does not warn about a protection scheme, and it requires more than an ordinary knowledge of Windows to overcome.

Don't forget to make a backup copy of your PROGMAN.INI file first, in case something goes wrong.

BRANCO MEDEIROS,
Belém Pará, Brazil

PC MAGAZINE: WINSTART.BAT is an optional batch file that's like AUTOEXEC.BAT for Windows. When you enter the WIN command, WINSTART.BAT actually runs before Windows itself is loaded; you can use it to make any kind of preparations for starting Windows. In the past we've discussed the [restrictions] entries in PROGMAN.INI; once you've restricted Windows, getting access to an unrestricted copy has always required hand-editing PROGMAN.INI. With this technique, the process is automated. If you have an existing WINSTART.BAT, just add the lines shown in Figure 1 to it and then hide it in another directory on your path.

The next-to-last line in Figure 1 completely removes the File menu from Program Manager, so visitors to your system will not have access to the File | Run menu. If you remove the icons for File Manager and any other shell-type utilities from your Program Manager groups, you can prevent visitors from running any programs other than those for which icons exist. Of course, to run File Manager yourself without an icon, you'll have to choose Run from the File menu and enter WINFILE, but protecting your Program Manager settings is worth this minor annoyance.

```
@Echo off
:*
:* Cleaning "restrictions": must be two passes, for
:* DOS will read
:* just 127 characters from a command line
:*
type c:\windows\progmman.ini|find/I/V
"[restrictions]"|find/I/V
"NosaveSettings="<>\>c:\windows\progmman.old
del c:\windows\progmman.ini
ren c:\windows\progmman.old progmman.ini
type c:\windows\progmman.ini|Find/I/V
"Editlevel="|find/I/V "NoFilemenu="|find/I/V
"Noclose="<>\>c:\windows\progmman.old
del c:\windows\progmman.ini
ren c:\windows\progmman.old progmman.ini
:*
:* Checking password-
if NOT (%pset%) == [password] goto lock
:*
:* If we got here, password test failed. Protect the
:* system lock
ECHO [Restrictions] <>\><>\><>\>c:\windows\progmman.ini
echo NosaveSettings=1 <>\><>\><>\>c:\windows\
Progmman.ini
echo editlevel=4 <>\><>\><>\>c:\windows\progmman.ini
:* Next line is optional - it eliminates the File
:* menu entirely
echo NoFileMenu=1
<>\><>\><>\>c:\windows\Progmman.ini
:OK
```



FIGURE 1: Use this version of WINSTART.BAT to restrict unauthorized users' access to Windows.

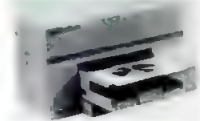


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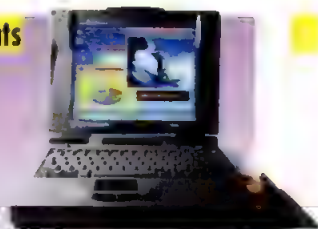
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adapter? I paid only \$340 for the whole package, but now I'm beginning to wonder if the deal was too good to be true.

JOHN BUFFALO, Victorville, California

PC MAGAZINE: There's a good chance that this bargain can be salvaged, but it may be a lost cause. The good news is that it shouldn't cost much to find out.

Mr. Buffalo's letter doesn't mention a model number for the monitor, but the only 17-inch color monitor with BNC connectors from HP that I can find in my references uses a fixed frequency. The specifications for this product are a 63.3 kHz horizontal scan rate with a 60 Hz vertical refresh rate. This means that it will produce fewer than 1,055 lines of data (divide the 63,300 horizontal scans per second by the 60 screen refreshes per second).

The nearest standard PC resolution for this would be 1,280 by 1,024 (which is the same as the number of scan lines). The monitor will need to receive a signal at this resolution to synch on the signal and display an image. Since this is a fixed-frequency monitor, it can't handle signals at any other resolution. We are accustomed to monitors that can synchronize automatically with a wide range of signals, but not all monitors have this capability.

Most PCs power up in a VGA mode (640-by-480 resolution), which this monitor cannot handle. You will need to run graphical programs (such as Windows) with your graphics adapter configured for a 1,280-by-1,024 resolution and a 60 Hz refresh rate to obtain any success. Even then, there is a chance that the timing of the signals produced by the graphics card will not match the monitor's requirements sufficiently; if it is close, you may be able to get an adequate image by playing with the monitor's size and position controls.

If you're able to get the monitor working under these conditions, you may have a bargain Windows display, but you'll still need to find a way to do DOS computing. Fortunately, there is a relatively easy answer for this. Find an old-fashioned monochrome display

with an adapter, install them, and change your CMOS settings so that the computer boots using this new display. When you run Windows, the graphics adapter will take over in high resolution, and you can work on your big color display.

Unfortunately, you tend to get what you pay for—and even less than that, sometimes—when it comes to orphaned or unusual computer equipment. With equipment like this monitor, you have to accept a significant risk that you won't get it working and then spend the time and effort involved with getting it working. If you like the challenge and can accept the risk, you may wind up with an attractive bargain in the end.—*Alfred Poor*

OPERATING ENVIRONMENTS

Interpreting Command Line Parameters



I remember reading about a way to interpret command line parameters correctly whether they're in uppercase or lowercase. The method had something to do with using the parameter as a variable name in a batch file. Can you refresh my memory?

EDWARD J. MARTIN, via ZD Net

```
@ECHO OFF
REM UPPER.BAT - checks command-line parameter against
REM a list of strings by using an e-var,
REM with e-var erasure protection
IF '%1==' GOTO NoGood
ECHO SET Marx_V=%%1%> C:\BAT\TEMPMARX.BAT
REM DO NOT substitute COMMAND /C for CALL in next line
CALL C:\BAT\TEMPMARX.BAT
DEL C:\BAT\TEMPMARX.BAT
IF NOT '%Marx_V%'==' GOTO Used
SET %1=WhyADuck?
SET RealName=
IF '%Groucho%'=='WhyADuck?' SET RealName=Julius
IF '%Chico%'=='WhyADuck?' SET RealName=Leonard
IF '%Harpo%'=='WhyADuck?' SET RealName=Arthur
IF '%Zeppo%'=='WhyADuck?' SET RealName=Herbert
IF '%Gummo%'=='WhyADuck?' SET RealName=Milton
SET %1=
IF '%RealName%'==' GOTO NoGood
ECHO %1 Marx's real name is %RealName%
SET RealName=
GOTO End
:==== Used =====
ECHO An e-var named "%1" is in use.
SET Marx_V=
GOTO End
:==== NoGood =====
ECHO There is no Marx Brother named "%1"!
:==== End =====
```



FIGURE 1: This batch file demonstrates a technique for comparing batch file parameters to particular text strings without regard for uppercase or lowercase.

PC MAGAZINE: Using the parameter as a variable name is indeed the key, because DOS ignores the case of variable names. To test a parameter against one or more values without regard for case, you define a variable whose name is the parameter and whose value is a string that's not likely to appear accidentally. So, for example, to test whether the %1 parameter is "Solutions", whether it's entered that way or as "sOIUtIoNs", you might use these lines:

```
SET %1=d'Sparil
IF '%Solutions%'=='d'Sparil' GOTO Yes
```

There is one danger with this technique: It can wipe out an existing environment variable. If the user passed PROMPT on the command line, for example, the preceding batch lines would wipe out the DOS prompt. Figure 1 shows a batch file that avoids this danger.

After confirming that there is a %1 parameter, UPPER.BAT creates a temporary batch file containing a command to set the variable Marx_V to the value of an environment variable named by the %1 parameter. UPPER then CALLs that temporary batch file and checks the value of Marx_V. If Marx_V is not empty, that means the %1 parameter names an existing variable, and it's not safe to continue. Now UPPER.BAT creates a variable with the %1 parameter as its name and gives it the value "WhyADuck?" For each of five possible strings, UPPER.BAT checks to see if a variable with that name has the value "WhyADuck?" Again, since DOS ignores the case of variable names, it doesn't matter whether the user entered uppercase, lowercase, or a mixture.

Chances are good you don't actually need a batch file that identifies the Marx brothers, but you can modify this example to suit your own purposes. And as usual, if you don't store your batch files in CABAT, you'll need to replace CABAT with the name of the directory you do use.—*Neil J. Rubenking*

A Bogus SHARE to Fake Out DOS Programs

I have a DOS application that won't load under OS/2. I get an error message saying that I need to add SHARE.EXE to my AUTOEXEC.BAT. But I can't find SHARE in either my \OS2 or \OS2\MDOS directories. Do I need to copy it from a DOS disk?

ROB BROWNING, via the Internet

PC MAGAZINE: You don't actually need SHARE.EXE—the functions it performed for DOS are built into OS/2 and are available automatically. Unfortunately, many DOS programs don't wait to see if they run into difficulties, they simply check your AUTOEXEC

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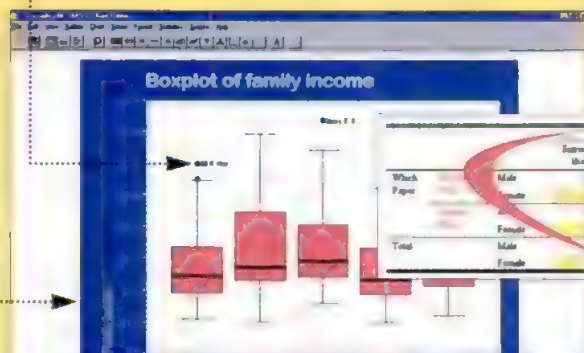
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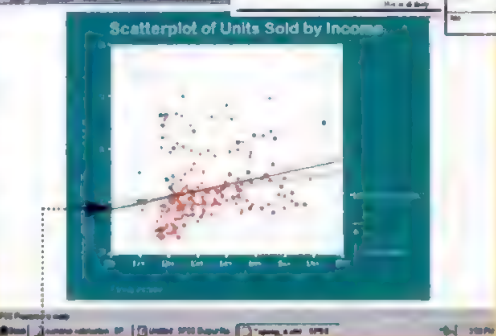
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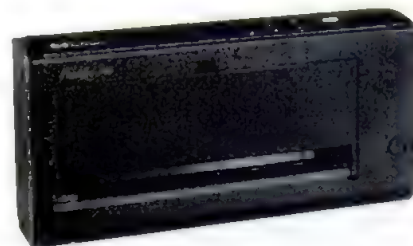
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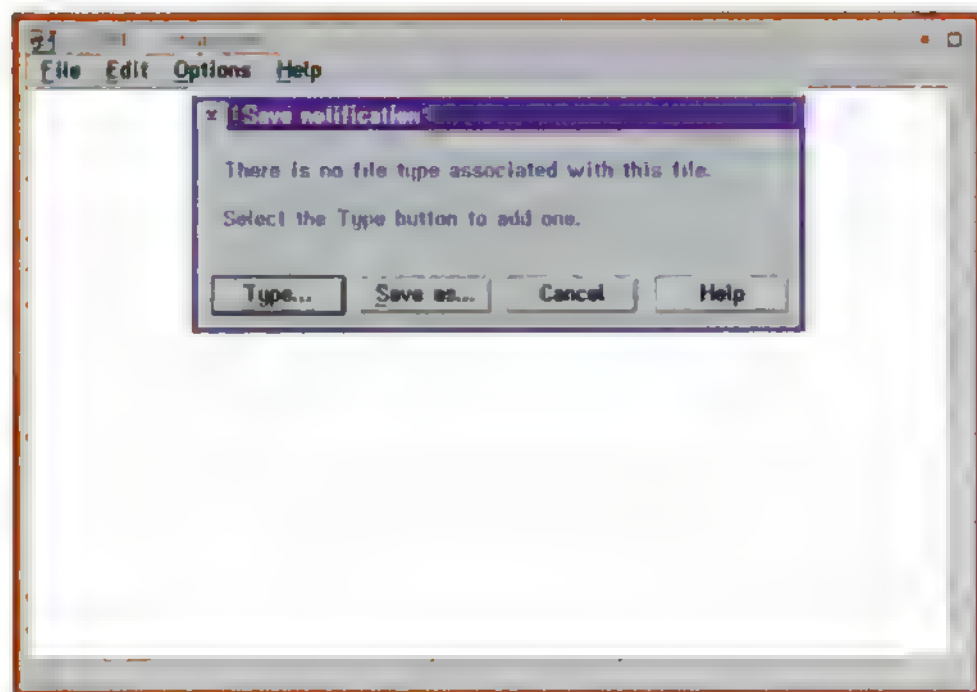


FIGURE 2: OS/2 insists on a type even though the file is empty.

.BAT file to see if SHARE was loaded.

You can fool most of these programs simply by creating an empty file named SHARE.EXE and "loading" it in your AUTOEXEC.BAT. Open an OS/2 command prompt and go to the root directory of the OS/2 boot drive. Type

```
e share.exe
```

to open the OS/2 System Editor. Now, without typing anything, open the File menu and select Save. OS/2 will ask you to assign a type to the file (Figure 2) and you should select Plain Text. You now have an empty file (well, actually it contains 1 byte to indicate the end of file) named SHARE.EXE. Now edit your AUTOEXEC.BAT file and add the line:

```
SHARE.EXE
```

In many cases, a DOS program will check for that line and, after finding it, proceed to execute without error.

Note that this problem can also occur if you installed OS/2 on a partition other than C: and your C: drive is unformatted. In this case, simply formatting the C: drive may make the problem disappear.—*Brian Proffitt*

Managing Your Windows Swap File

For some time I've been irritated by a file on my hard disk that refuses to go away. The file is called 386SPART.PAR, and it uses over 52MB of space on my disk. I've used DELTREE again and again to delete the file, but it just keeps reappearing. What is this file and where does it come from?

H. H. PARKER, Houston, Texas

PC MAGAZINE: Don't do that! Pardon the emphasis, but you really should not delete the 386SPART.PAR file. This is the file Windows uses to create virtual memory for your system;

it's called the permanent swap file. The amount of disk space set aside for 386SPART.PAR is translated by the Windows virtual memory manager into increased memory for your system. But 52MB does sound extravagant. On most systems, you would run out of Windows free system resources long before you could load enough programs to fill that much RAM. Virtual memory is really meant to hold programs that are loaded but not currently active—swapping

data to and from the disk is incredibly slow compared with ordinary memory access.

If you want to reduce the amount of disk space this file occupies or even reclaim that space completely, you need to change the virtual memory settings in Control Panel. Open the Main group in Program Manager and double-click on the Control Panel icon. Find the 386Enh applet and launch it. Press the Virtual Memory... button and then press the Change> button. Now you can either change the swap file type to Temporary or reduce the size of the permanent swap file. This is the right way to remove or resize 386SPART.PAR. As you've seen, if you delete it at the DOS prompt, it will just keep haunting your system.—*Neil J. Rubenking*

Keeping Your System Tidy

Is there any software that would clean up my system (especially my WIN.INI and SYSTEM.INI files) automatically after I delete files or group items? If not, what's the best way to do this manually?

ALEX BELOUSOV, Rego Park, New York

PC MAGAZINE: The PC Magazine utility InCtrl2 (described in our issue of September 26, 1995) can help you uninstall applications by giving you a clear record of the files and directories added during installation, as well as sections and keys changed or added in WIN.INI and SYSTEM.INI. You'll need to delete the application's .EXE file, of course, and any support files that obviously belong to this program and no other. You can probably delete all files in directories that were created during the program's installation, but be sure to rescue any data files you may have stored there. If the program has a private .INI file in the Windows directory, you can delete that too.

A problem may arise resulting from shared files or shared lines in WIN.INI and SYSTEM.INI. Suppose you know that the pro-

gram installed one or more support DLLs in the Windows System directory. You can't simply delete these along with the program, because other programs might use them as well. The same is true of lines or sections added to WIN.INI and SYSTEM.INI. You need to remove these items provisionally and be prepared to restore them if other programs need them. In the case of support files, you can hide them by renaming the files (just change the extension) or by moving them to a holding directory that's not on the PATH. And instead of deleting lines from WIN.INI and SYSTEM.INI, comment them out by inserting a semicolon as the first character in the line. After you've run all your other programs for a few days and confirmed that they still work, you can dispose of the unnecessary files and delete the superfluous .INI file lines.

Of course, you may want to delete programs you installed long before you heard of InCtrl2. In that case, one of the many uninstall utilities such as MicroHelp's Uninstaller 2 or Solid Oak Software's Disk Historian can be helpful. These programs can't necessarily find every file and every .INI entry associated with the program you're trying to remove, but they'll catch most of them. And many of these utilities include the ability to search for files or .INI file lines "orphaned" by earlier attempts to uninstall. You really do need a little outside help to keep your Windows configuration tidy.—*Neil J. Rubenking*

WORD PROCESSING

Eliminating the File Menu List in Ami Pro 3.1



Because I share a computer with someone else, there are times when the list of recently opened files on the Ami Pro 3.1 file menu is a problem. Sometimes I don't want anyone else to know exactly what files I've been working on. Is there any way to get rid of this list?

BILL MCCOULOUGH, via the Internet

PC MAGAZINE: It's easy to hide the names of recently used files: All you have to do is choose Tools | User Setup, then change the number in the Recent Files box to 0. Unfortunately, this method is easily defeated—another user can see the list of recently opened files simply by changing the number back to anything from 1 to 5. To really eliminate the names, you'll have to edit the AMIPRO.INI file.

You'll find AMIPRO.INI in your Windows directory. You can open it with any text editor, including Notepad in Windows 3.1 or Windows 95. In fact, you can open it along with Notepad by going to Program Manager in

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386 (5.0V)	14.00	18.00	22.00	26.00
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386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00

ZENITH MEMORY MODULES

Model	128K	192K	256K	384K
386	14.00	18.00	22.00	26.00
386 (3.3V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00

PCMCIA VERSION 2.0

Model	128K	192K	256K	384K
386	14.00	18.00	22.00	26.00
386 (3.3V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00

IBM PS/1, PS/2 MEMORY MODULES

Model	128K	192K	256K	384K
386	14.00	18.00	22.00	26.00
386 (3.3V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00

IBM NOTEBOOK & LAPTOP MEMORY

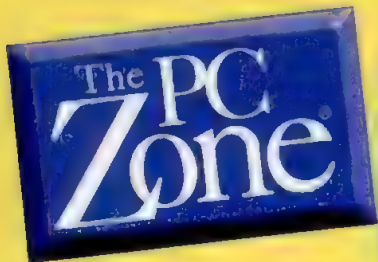
Model	128K	192K	256K	384K
386	14.00	18.00	22.00	26.00
386 (3.3V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00

COMPAQ MEMORY MODULES

Model	128K	192K	256K	384K
386	14.00	18.00	22.00	26.00
386 (3.3V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00
386 (5.0V)	14.00	18.00	22.00	26.00

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486SX 586SX 3274K 586SX		128K 192K 256K 384K
LITE 5850-20	486SX 586SX	171125-00R
LITE 5850-20	486SX 586SX	113740-00R
LITE 1170 25 25C	486SX 586SX	128730-003
LITE 1170 25 25C	486SX 586SX	128730-003
LITE 1170 25 25C	486SX 586SX	128730-003
LITE 425C 25C 256/256	486SX 586SX	128730-003
LITE 425C 25C 256/256	486SX 586SX	128730-003
LITE 425C 25C 256/256	486SX 586SX	128730-003
LITE 425C 25C 256/256	486SX 586SX	128730-003
LITE 425C 25C 256/256	486SX 586SX	128730-003
LITE 425C 25C 256/256	486SX 586SX	128730-003
LITE 425C 25C 256/256	486SX 586SX	128730-003
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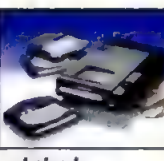
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Windows 3.1 and choosing File | Run or going to the Start button in Windows 95 and choosing Run. In either case, enter AMIPRO.INI in the text box and choose OK.

Now find the [Ami Pro] section in the file and look for the lines that begin LastOpen1=, LastOpen2=, and so forth, up to LastOpen5=. The lines won't necessarily be together or in order. To get rid of the filenames, simply delete everything after the equal sign on each of these lines and then save the AMIPRO.INI file. The next time you open Ami Pro, the File Menu won't include a list of recently opened files.—M. David Stone

SPREADSHEETS

Changing Case in Excel



In my work in Excel, I occasionally need to change the case of a block of text—for example, from uppercase to lowercase or initial capitals, or proper. To make these case changes easy, I put the following macro in my PERSONAL.XLS workbook:

```
Public ShiftCase as Integer
Sub CaseChanger()
    ShiftCase = ShiftCase + 1
    If ShiftCase >> 3 Then ShiftCase=1
    For Each Item In Selection
        Select Case ShiftCase
            Case 1
                Item.Value =
                    LCase(Item.Value)
            Case 2
                Item.Value =
                    UCase(Item.Value)
            Case 3
                Item.Value =
                    Proper(Item.Value)
        End Select
    Next Item
End Sub

Sub CaseChangerDialog()
    Dim CaseDialog As Object
    Dim Lower As Object
    Dim Upper As Object
    Set CaseDialog = DialogSheets("CaseDialog")
    Set Lower = CaseDialog.OptionButtons("Lower")
    Set Upper = CaseDialog.OptionButtons("Upper")
    If CaseDialog.Show Then
        For Each Item In Selection
            If Lower = x1On Then
                Item.Value = LCase(Item.Value)
            ElseIf Upper = x1On Then
                Item.Value = UCase(Item.Value)
            Else
                Item.Value = Application.Proper(Item)
            End If
        Next Item
    End If
End Sub
```

FIGURE 3: This Excel macro makes changing the case of text a simple matter of choosing the correct selection button from a dialog box. Be sure to insert a dialog macro module named CaseDialog, with buttons named and labeled Lower and Upper and a third labeled Proper.



```
Case 3
    Item.Formula =
        Application.Proper(Item)
End Select
Next Item
```

I added a custom button to my standard toolbar and linked the button to the CaseChanger macro. Now when I want to change the case of a text block, I simply select the block and click the custom button. Successive clicks cycle the selection from lowercase to uppercase to proper case, so I just click the button as many times as necessary until I get to the style I want.

MARK T. RUZICKA,
Florham Park, New Jersey

PC MAGAZINE: Mr. Ruzicka's macro cycles through the three possible case states—lower, upper, and proper. The advantage of this approach is that you don't have to create a dialog box. The disadvantage is that you may have to hit the button (or run the macro by some other means) two or three times to get your text selection the way you want it.

The alternative in Figure 3 displays a dialog box, from which you may choose a capitalization style directly. This version assumes that you have inserted a dialog sheet named CaseDialog into your PERSONAL.XLS file (or whatever workbook you're creating the macro in). Choose Insert | Macro | Dialog and then click on selection button controls in the dialog button bar.

Then add option buttons from the control toolbar and name them Lower and Upper. You'll also want a third button for the proper-case option, of course, but since this button isn't referenced in the macro code, it doesn't matter what you name it. Figure 4 shows an example of such a dialog sheet.

One comment about Mr. Ruzicka's code: The Public statement that begins it ensures that the ShiftCase variable will retain its value from one run of the macro to the next. Without it, ShiftCase will always be 0 at the time the macro is invoked, and each run of the macro will increment ShiftCase to 1, giving you lowercase text. Alternatively, you could begin the macro with

```
Static Sub CaseChanger()
```

```
instead of
```

```
Sub CaseChanger()
```

to ensure that ShiftCase retains its value in later runs of the macro.—Craig Stinson

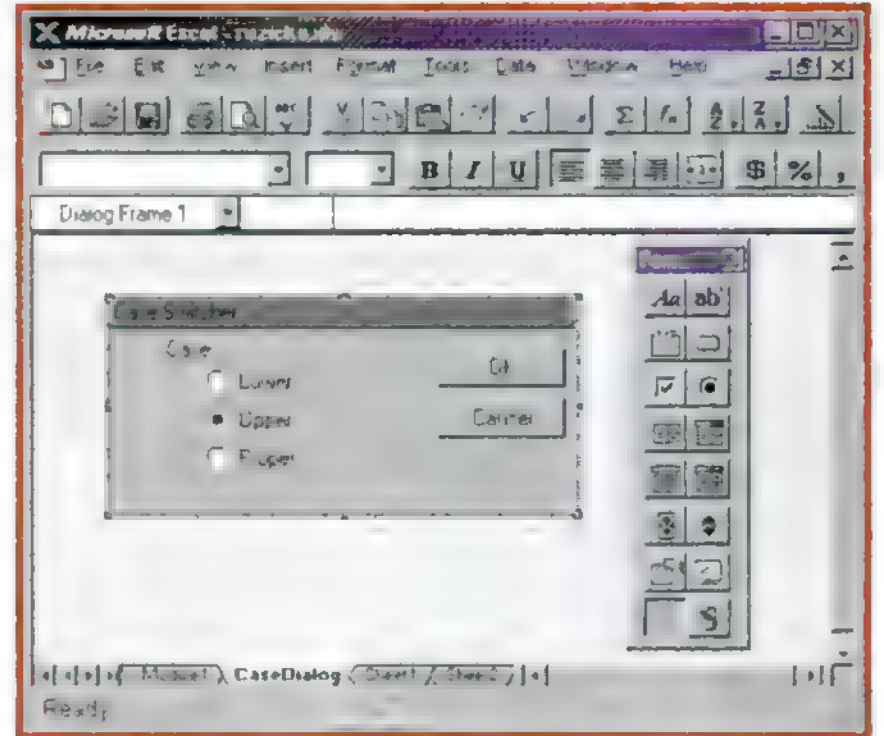


FIGURE 4: Insert the CaseDialog dialog sheet into the workbook you're creating the macro in, so that the macro will display a dialog box.

DATABASES

Changing Title Bar Captions in Access



I was excited to see my tip published in the Solutions column of October 24, 1995. Since then I've discovered even more ways to customize Microsoft Access 2.0.

As you pointed out, you can customize the caption in the title bar of the main Access window using the Microsoft Access Developer's Toolkit, Version 2.0. I don't have the Developer's Toolkit, but I found out that I can do this anyway by adding the following section to the MSACC20.INI file located in my C:\WINDOWS directory:

```
[Run-Time Options]
StartupScreen=C:\Castle.bmp
TitleBar=My Application Title
Icon=C:\Castle.ico
```

You can even customize the StartupScreen! I use a small bitmap for the start-up screen because it loads faster than Access's splash screen. Note that the Access icon can be changed as well.

ROB MCCORMACK,
Thunder Bay, Ontario, Canada

PC MAGAZINE: That's a neat trick. It turns out that all the Run-Time Options settings described in the Microsoft Access Developer's

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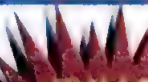
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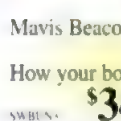
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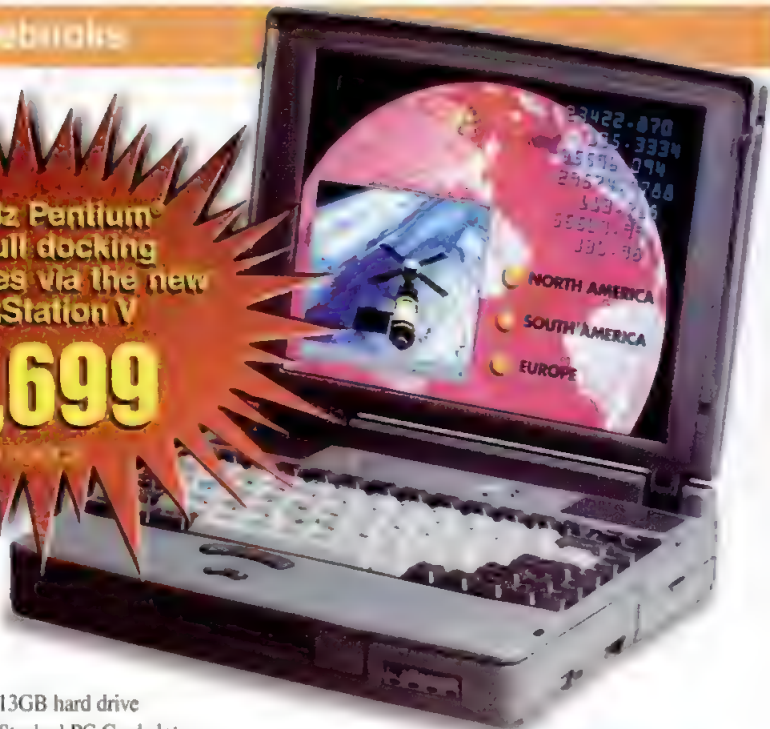
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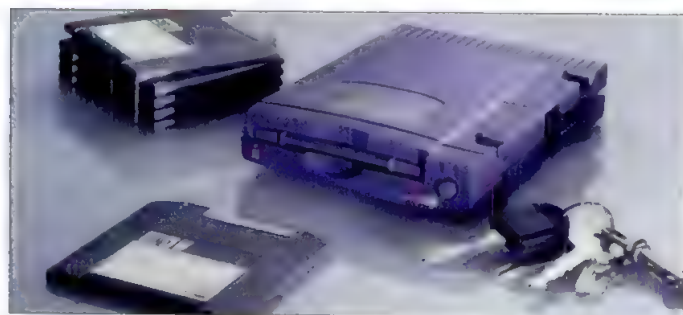
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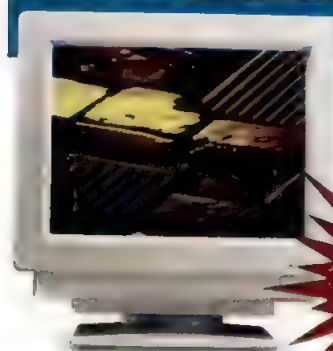
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1090MB	12ms	3.5" 1"H	Fast-ATA-2	64	4,500	FJ1614A	215	265*
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850MB	14ms	3.5" 1"H	Fast-ATA-2	128	4,500	QUTR850A	\$209	\$259*
1080MB	12ms	3.5" 1"H	Fast-ATA-2	128	5,400	QUFB1080A	235	285*
1280MB	12ms	3.5" 1"H	Fast-ATA-2	128	5,400	QUFB1280A	259	309*
Maxtor								
540MB	12ms	3.5" 1"H	Enhanced IDE	32	3,600	MX7540AV	\$179	\$229*
850MB	12ms	3.5" 1"H	Enhanced IDE	64	3,600	MX7850AV	205	255*
1260MB	12ms	3.5" 1"H	Enhanced IDE	256	4,500	MX71260AV	260	310*
1620MB	11ms	3.5" 1"H	Enhanced IDE	256	4,500	MX71626A	349	399*
CONNER								
635MB	14ms	3.5" 1"H	Enhanced IDE	32	3,600	CFS635A	\$185	\$235
850MB	14ms	3.5" 1"H	Enhanced IDE	32	3,600	CFS850A	199	249
1275MB	14ms	3.5" 1"H	Enhanced IDE	32	3,600	CFS1275A	259	309
IBM								
540MB	12ms	3.5" 1"H	Fast-ATA	256	4,500	IB06H7141	\$185	\$205
1080MB	10.5ms	3.5" 1"H	Fast-ATA	512	5,400	IB94G3186	269	319

*Bundled with GSI Model 21 EIDE Accelerator. **Capacities based upon manufacturer's quoted capacity where 1MB = 1,048,576 bytes.

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Toolkit (ADT), Version 2.0 also work in the regular 2.0 retail product.

These settings were really intended for custom .INI files that ship with your runtime applications (that's why the settings are documented only in the ADT). According to the ADT, you specify your application's .INI file using the /ini option on the runtime command line, and the .INI file specifies the application's start-up splash screen, application title, and icon. You can also specify a custom help file by adding a line like the following to the Run-Time Options:

```
HelpFile=c:\myhelp.hlp
```

Desktop users of the 2.0 retail product will find the .INI settings useful for specifying an application title, start-up screen, icon, and custom help file when starting up Access. Figure 5 shows an example of what you can do with these customizations. To do this I added the following lines to the MSACC20.INI file in my Windows directory:

```
[Run-Time Options]
StartupScreen=C:\sraccess.bmp
TitleBar=Sal's Microsoft Access
Icon=C:\pcmag.ico
```

Remember, these .INI file settings are used only once at start-up. That means the application title in the title bar won't change if you open another database, which is why the technique introduced in the issue of October 24, 1995, is still useful. If you use more than one database during an Access session, you can

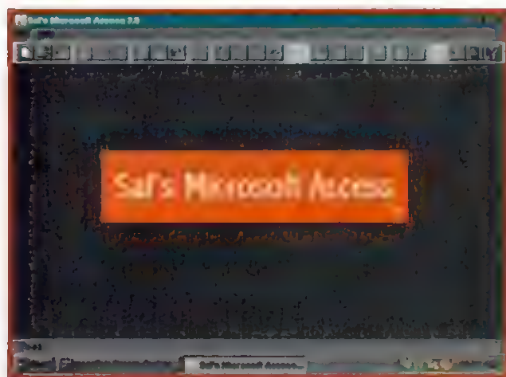


FIGURE 5: You can customize your Microsoft Access 2.0 environment by specifying your own start-up splash screen, icon, and application name for the title bar, as demonstrated here.

customize the Access caption for each database individually by calling the ChangeAccessCaption() function shown in the October issue from each database's AutoExec macro. You should probably call the ChangeAccessCaption() function in the On Close event for your main Form too, in order to reset the caption back to "Microsoft Access."

Microsoft Access for Windows 95 makes all

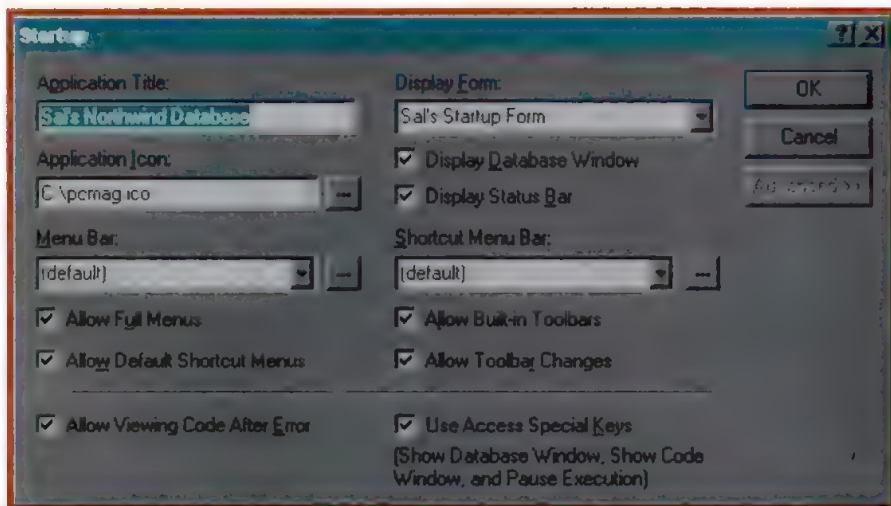


FIGURE 6: In Microsoft Access for Windows 95 you can specify many of the same options by selecting the Tools menu and choosing Startup. Note that the two check boxes below the horizontal line appear only when you press the Advanced>> button.

this easier by supplying the Startup dialog shown in Figure 6, which you call up from the Tools menu. (Note that the items below the horizontal line in Figure 6 are not visible when the dialog first appears. Pressing the Advanced>> button enlarges the dialog to show them and then disables the Advanced>> button.) The Startup settings shown here are saved for each database as database properties, so you can have different settings for each database. As long as you do this, Access 95 automatically displays the correct application title when you switch databases.

You'll note that in Figure 6 there's a place for an application title and an application icon, but not for a start-up splash screen. That's because the Display Form setting in Access 95 replaces the StartupScreen setting used in Access 2.0. Now, instead of supplying the filename for a bitmap, you select an Access Form from your database to display when the database is opened.

You might think this leaves no apparent way to display a start-up bitmap when you start Access. But you can accomplish this task easily enough by creating a new empty Form and setting its Picture property to the name of your .BMP file. Just make the form Modal, set all the "allow" properties to No, and turn off all the properties that represent visual elements like scroll bars and navigation buttons. Then set the Timer Interval property to 2,400 milliseconds and add an event procedure to the On Timer event. In the event procedure, add the following line:

```
DoCmd.Close
```

(You may have to adjust the Picture Size

Mode property to get the effect you want. It defaults to Clip, but you might want to try Stretch or Zoom.)

Then call up the Startup dialog from the Tools menu and change Display Form to the name of the Form you just created. Now when you open your database, the Form you specified will appear and the timer interval will count down to zero. At that point the On Timer event will kick off, causing the DoCmd.Close code to close the bitmap Form and remove it from your display. If you get all the properties set right, it'll look and act just as if you had used the 2.0 StartUpScreen option to display a bitmap.

One advantage to this technique is that you can set the Form's Picture Type to Embedded, in which case the .BMP is stored with the database and won't be accidentally lost or deleted.—*Sal Ricciardi*

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\$2629 \$2584

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950N Pentium® 75 8/1200MB Dual	3248	3188
950N Pentium® 90 8/800MB Dual	3399	3249
950N Pentium® 90 8/1200MB Dual	3628	3578
950N Pentium® 75 8/1200MB Active	4148	4098
950N Pentium® 90 8/1200MB Active	4528	4478

IBM

701CS 4/75 8/540MB Active	\$3649	\$3449
701C 4/75 8/540MB Active	3949	3899
755CX Pentium® 75 8/540MB Active	4699	4649
755CX Pentium® 75 8/810MB Active	5039	4999
755CD Pentium® 75 8/810MB CD Act.	4789	4749
760C Pentium® 120 8/720MB 12.1" Act.	6699	6399
760CD Pentium® 90 8/1200MB 12.1" Act.	7249	7199

NEC

2000D 4/75 4/350MB Dual	\$1799	\$1779
2000C 4/75 4/350MB Active	1999	1979
2000C 4/75 8/540MB Active	2489	2449
4000D Pentium® 75 8/540MB Dual	3339	3299
4000D Pentium® 75 8/540MB/CD Dual	3599	3549
4050CD Pentium® 90 8/1000MB/CD Act.	4549	4499
4080H Pentium® 120 8/1000MB Active	5049	4999



Extensa 450 DX4/75 4/340MB Dual	\$1729	\$1629
Extensa 550 P/75 8/524MB Dual	2439	2429
Extensa 550CD P/75 8/524MB/CD Dual	2909	2879
Extensa 550CD P/75 8/524MB/CD Act.	3469	3429
TM5100 Pentium® 90 8/1200MB Active	4599	4559
TM5200 Pentium® 120 8/1200MB Active	5049	4999

TOSHIBA

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T2130CS 4/75 8/500MB Dual	1999	1949
T400CS Pentium® 75 8/810MB Dual	2929	2899
T410CS Pentium® 90 8/810MB Dual	3649	3449
T400CD P/75 8/810MB/CD Act.	3898	3848
T410CD P/90 8/810MB/CD Active	4619	4569
T700CS Pentium® 120 8/1200MB Dual	4849	4599
T700CT Pentium® 120 16/1200MB Act.	5829	5779

MULTIMEDIA



Creative
Multimedia Kit
8000
\$554 \$524

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NEC

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6XI Internal 6X Speed	449	434



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27mm 1280 x 1024
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156SD 15" 28mm	\$369	\$349
176SGMe 17" 27mm	674	639
178SGMe 17" 26mm	729	694
208S 20" 28mm	1149	1099



DX15F 15" 28mm	\$394	\$374
DX17F 17" 26mm	674	639



Diamond Scan 15HX 15" 28mm	\$439	\$419
Diamond Scan 17HX 17" 26mm	904	859
Diamond Pro 17TX 17" 25mm	1069	1049
Diamond Pro 21TX 21" 30mm	1929	1879

NEC

Multisync XV15 15" 28mm	\$479	\$454
Multisync XV17 17" 28mm	739	729
Multisync XP17 17" 28mm	1079	1029
Multisync XE21 21" 28mm	1829	1779
Multisync XP21 21" 28mm	2199	2149

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PanaSync Ci1591E 15" 27mm	\$419	\$399
PanaSync Ci1791E 17" 27mm	779	739
PanaMedia 17 17" 27mm	804	789
PanaSync Pro C2192P 21" 25mm	1779	1729

SONY

CPD-1425 14" 25mm	\$304	\$241
Multiscan 15af 15" 25mm	489	465
Multiscan 17af 17" 25mm	894	849
Multiscan 20e 20" 30mm	1949	1899

VIDEO CARDS



matrox
MGA Millennium
2MB PCI MPEG
\$309 \$293



	ELP	BCP
Graphics Xpression 1MB ISA	\$138	\$131
Graphics Xpression 2MB VLB	185	175
WinTurbo 2MB PCI	267	253
Graphics Pro Turbo 2MB PCI	314	297
Graphics Pro Turbo 4MB PCI	439	419



Speedstar Pro 1MB VLB DRAM	\$98	\$88
Stealth 64 2MB VLB VRAM	334	319
Stealth 64 4MB PCI VRAM	489	464
Stealth Video 2MB DRAM PCI	202	191



9FX Vision 330 2MB PCI	\$175	\$166
9FX Motion 531 2MB PCI	217	206
9FX Motion 771 4MB PCI	434	414

PRINTERS



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Stylus Color II Inkjet
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\$454 \$429

	ELP	BCP
Stylus Color IIs	\$283	\$268
Stylus Color Pro	\$774	\$734

Canon

BJC-4100 Color Inkjet	\$374	\$364
BJC-610 Color Inkjet	564	534
LBP-460 600DPI	384	364
LBP-1260 600DPI	1349	1279
Multipass 1000 Multifunction	724	689



Deskjet 600 Inkjet	\$299	\$284
Deskjet 660C Color Inkjet	404	384
Deskjet 850C Color Inkjet	504	484
Laserjet 5L 600DPI	514	489
Laserjet 5P 600DPI	889	844
Laserjet 5MP 600DPI	1029	979

LEXMARK

Optra R+ 1200DPI	\$1499	\$1419
Optra Rx+ 1200DPI	1679	1599
Optra Lx+ 1200DPI	2329	2199
Optra Lx+ 1200DPI	3049	2879
Medley 4C 300DPI Multifunction	709	674

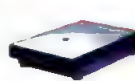


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MICROTEK

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Vista-S8 PCLE2	664	629
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\$199 \$189

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Sportster 28.8 V.34 Data/Fax Internal	183	173
Sportster 28.8/Fax PCMCIA	278	264

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MVP 28.8/V Ext. Voice/Fax/Modem	176	167



Accura 144B+ FAX144 Internal	\$98	\$88
Accura 144+ FAX144 External	110	104
Accura 288 V.34/VRC+ FAX Internal	185	175
Accura 288 V.34/VRC+ FAX External	219	208



PM144HC II 14.4/Fax	\$77	\$69
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PM288MT II V.34 28.8/Fax	167	158
PM288MT II V.34 28.8/Fax	167	177
PC288 28.8/Fax PCMCIA	259	246

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Caviar 850MB EIDE	208	197
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Filepro 1275MB EIDE	268	254



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71350A 1GB EIDE	243	230
71626AP 1.6GB EIDE	314	299



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Trailblazer 850MB SCSI-2	215	204



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Pentium 120 11.3" Active 1.3GB 5949



Tecra 700

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Processor	Screen	MB	Price
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486DX4/75	10.4" Dual Scan	500MB	1969
486DX4/75	10.4" Active	500MB	2499

Satellite 2110/2130



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Satellite Pro 400 & Satellite Pro 410

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- Integrated Accupoint - small, accurate & easy to use
- Lithium Ion battery technology
- Built-in antenna for wireless communications

Satellite Pro 400

Processor	Screen	MB	Price
Pentium 75	10.4" Dual Scan	772MB	\$2999
Pentium 75	10.4" Active	772MB	3999

Satellite Pro 410

Processor	Screen	MB	Price
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Pentium 90	11.3" Active	772MB	4679

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- MS Windows 95 or Selecta System models available

Processor Screen MB Price

486DX4/75	10.4" Dual Scan	540MB	\$1999
486DX4/75	10.4" Active	540MB	2599
486DX4/75	10.4" Dual Scan	540MB	2499*
486DX4/75	10.4" Active	540MB	3099*

*Multimedia Models

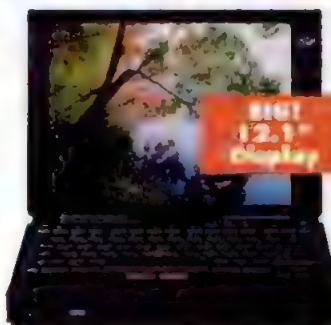
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- SoundBlaster compatible audio & telephony
- Lithium Ion battery technology

Processor Screen MB Price

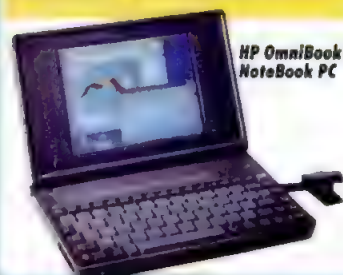
Pentium 90	10.4" Active	720MB	\$5349
Pentium 90	12.1" Active	720MB	6049
Pentium 120	12.1" Active	720MB	6599
Pentium 90	12.1" Active	1.2GB	7449*

*Features built-in CD-ROM drive
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ThinkPad® 760

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HP OmniBook 600

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- Built-in infrared for no-hassle printer connections
- Lithium Ion battery technology (active model only)
- Instant "ON" ready-to-work state -- lasts for months on a charge

Processor Screen MB Price

486DX4/75	9.5" Dual Scan	340MB	\$2539
486DX4/75	9.5" Active	340MB	2999

HP OmniBook 5000

- Up to 120MHz Pentium with 32-bit PCI Local bus
- 1.2GB drives available for high capacity storage
- High resolution - 800x600 resolution on notebook display
- Built-in 16-bit sound, microphone & speaker

Processor Screen MB Price

Pentium 90	10.4" Active	1.2GB	\$5329
Pentium 90	10.4" Active	1.2GB	5889*
Pentium 120	10.4" Active	1.2GB	6539*

*16MB RAM standard

90MHz & 120 MHz Pentium
with 1.2GB



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Extensa 450

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- GlidePad pointing device
- Advanced battery Pro
- Built-in infrared for no-hassle printer connections

Processor	Screen	RAM	Price
486DX4/75	10.4" Dual Scan	340MB	\$1649
486DX4/75	9.5" Active	340MB	2039

Extensa 550/550CD

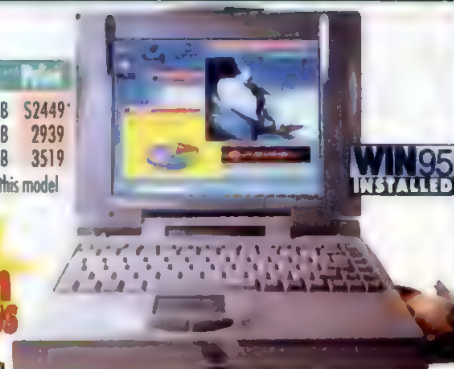
- 75MHz Pentium w/PCI bus & 256kB cache
- Built-in 2XCD-ROM drive (optional on some models)
- Built-in 16-bit sound, microphone & speaker (optional on some models)
- Integrated touchpad pointer
- 10.4" Active Matrix & 10.4" Dual Scan
- Built-in infrared for wireless communications

Processor	Screen	RAM	Price
Pentium 75	10.4" Dual Scan	524MB	\$2449*
Pentium 75	10.4" Dual Scan	524MB	2939
Pentium 75	10.4" Active	524MB	3519

*CD-ROM Drive is an optional accessory on this model

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Pentium
with PCI BUS**

Extensa 550CD



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- 16-bit Sound Card, Speaker, Microphone & MIDI
- Upgradeable hard drive - easily add more storage
- Built-In Dual Lithium Ion batteries
- Built-in infrared for no-hassle printer connections

Processor	Screen	RAM	Price
Pentium 75	10.4" Dual Scan	500MB	\$2769
Pentium 75	10.4" Active	772MB	3469
Pentium 90	10.4" Active	1.2GB	4199

TravelMate 5200

- Pentium 120MHz w/PCIbus
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 - 1.2GB Hard Drive
- Only \$5099**

NEC

Versa 2000

Processor	Screen	RAM	Price
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486DX4/75	9.5" Active	350MB	2399
486DX4/75	9.5" Active	540MB	2599

*14.4 fax/modem not built-in



NEC Versa 4000

NEC Versa 4000

- Built-in CD-ROM Drive (Standard on some models, optional on others)
- Pentium 75 and Pentium 90 processors
- 256KB Level 2 Cache to optimize performance
- Unbelievable display - 65K color Dual Scan (to 8 million color Active - High resolution Active Matrix displays available - 800x600 res.)
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Pentium 75	10.4" Dual Scan	540MB	\$3499
Pentium 75	10.4" Dual Scan	540MB	3799*
Pentium 75	10.1" Active	540MB	3999
Pentium 90	10.1" Active	810MB	4649*
Pentium 90	10.4" High Res.	810MB	4799
Pentium 120	10.4" High Res.	1 GB	5499

* Features built-in CD-ROM drive

COMPAQ

Contura 420/430

Processor	Screen	RAM	Price
486DX4/75	10.4" Dual Scan	420MB	\$2089
486DX4/75	10.4" Active	420MB	2559
486DX4/100	10.4" Dual Scan	720MB	2369
486DX4/100	10.4" Active	720MB	2939

LTE 5000 Series

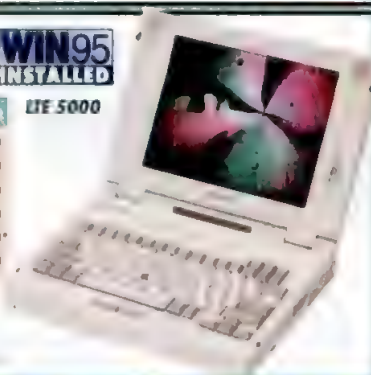
- Up to 120MHz Pentium power w/PCI bus & 256kB cache
- 32-bit PCI Local bus graphics
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- MultiBay - holds CD-ROM, 2nd HDD, floppy or 2nd battery
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Processor	Screen	RAM	Price
Pentium 75	10.4" Dual Scan	510MB	\$3799
Pentium 75	11.3" Dual Scan	810MB	4439
Pentium 75	10.4" Active	810MB	4729
Pentium 90	10.4" Active	810MB	5339
Pentium 90	10.4" Active	810MB	5599*
Pentium 120	10.4" Active	1.35GB	6379

* Features Built-in CD-ROM drive

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LTE 5000



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- Super fast 64-bit PCI local bus graphics
- Built-in MPEG support for full screen, full motion video
- 32-bit PCI IDE controller - fast disk performance
- LOADS of **FREE** software

Model	Processor	RAM	Price
Minitower	Pentium 75	1GB	\$1799
Minitower	Pentium 100	1GB	2099
Minitower	Pentium 100	1.6GB	2499*
Minitower	Pentium 120	1.6GB	2799*
Minitower	Pentium 133	1.6GB	2999*

Monitors priced separately *16MB RAM Standard

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- Advanced Telephony - 14.4 or 28.8 fax/modem, telephone answering system, and speaker phone (Differs by model. Call for details).
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Model	Processor	RAM	Price
Desktop (614)	Pentium 100	850MB	\$1679
Minitower (812)	Pentium 100	1.2GB	1819
Minitower (814)	Pentium 100	1.2GB	2109*
Minitower (816)	Pentium 133	1.6GB	2589*
Minitower (818)	Pentium 133	1.6GB	2679*

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- Loads of **FREE** software pre-installed

All New Models

Model	Processor	RAM	Price
Minitower (911)	Pentium 75	1.2GB	\$1799
Minitower (917)	Pentium 100	1.2GB	1999
Minitower (922)	Pentium 75	1.2GB	2199*
Minitower (931)	Pentium 100	1.6GB	2499*
Minitower (932)	Pentium 120	1.2GB	2599*
Minitower (933)	Pentium 120	1.6GB	2699*
Minitower (940)	Pentium 133	1.2GB	2799*
Minitower (2001)	Pentium 133	1.6GB	3099*

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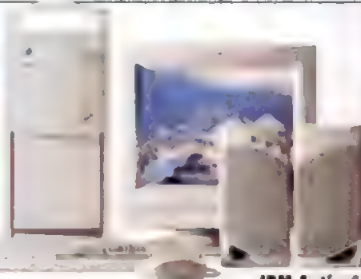
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- 16-bit stereo sound - SoundBlaster Compatible
- Advanced Telephony - 28.8 fax/modem, full duplex speaker phone, answering machine & voice mail
- 30 Watt stereo speakers
- Built-in MPEG support for full screen, full motion video
- Over 40 **FREE** software titles

Model	Processor	RAM	Price
Minitower	Pentium 75	1GB	\$1799
Minitower	Pentium 100	1.6GB	2299
Minitower	Pentium 120	1.6GB	2399
Minitower	Pentium 100	1.6GB	2599*
Minitower	Pentium 133	1.6GB	2899*

*16MB RAM standard
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Model	Processor	RAM	Price
Minitower	Pentium 75	1GB	\$1669
Minitower	Pentium 100	1GB	1799
Minitower	Pentium 133	1.2GB	2359+

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486DX2/50	9.5" Active	340MB	3079
486DX4/75	9.5" Active	340MB	3319
486DX4/75	9.5" Dual Scan	528MB	3079
486DX4/75	9.5" Active	528MB	3639

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Pentium 75	10.4" Dual Scan	800MB	2879
Pentium 75	10.4" Dual Scan	1.2GB	3249
Pentium 75	10.4" Active	800MB	3799
Pentium 75	10.4" Active	1.2GB	4199
Pentium 90	10.4" Dual Scan	800MB	3259
Pentium 90	10.4" Dual Scan	1.2GB	3639
Pentium 90	10.4" Active	800MB	4199
Pentium 90	10.4" Active	1.2GB	4579
			4919
			5199

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XJ2144	14.4/14.4 XJACK GOLD	179.99
XJ2288	28.8/14.4 XJACK	299.99
CC3288	28.8/14.4 PCMCIA	299.99
EM1144T	14.4/14.4 Ethernet Modem	349.99
XJEM1144T	14.4 XJACK Ethernet Modem	349.99
XJEM1144C	14.4 XJACK Ethernet Modem	369.99
XJEM3288T	28.8/14.4 XJACK Ethernet Modem	449.99
XJEM3288C	28.8/14.4 XJACK Ethernet Modem	469.99

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Courier 14.4/14.4 PCMCIA - 0754-0.....	379.99
Sportster 28.8/14.4 PCMCIA - 001013-0.....	349.99
Courier 28.8/14.4 PCMCIA - 001015-0.....	439.99
Sportster 14.4/14.4 Internal - 0921-0.....	309.99
Sportster 28.8/14.4 Internal - 000840-0.....	209.99
Sportster 28.8/14.4 Internal DSVD - 0980-0.....	319.99
Sportster 14.4/14.4 External - 0922-0.....	89.99
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PC-6100-41402C	Pentium 75MHz	10.4" DSTN	540MB/2X	\$3,799
PC-6100-11402	Pentium 75MHz	10.1" TFT	540MB	\$3,999
PC-6100-11602C	Pentium 90MHz	10.1" TFT	810MB/2X	\$4,649
PC-6110-71602	Pentium 90MHz	10.4" Hi-Res TFT	810MB RAM	\$4,799
PC-6120-71702	Pentium 120MHz	10.4" Hi-Res	1GB	\$5,499

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PC-6010-11301W	9.5" TFT	350MB/4MB RAM	\$2,099
PC-6010-11302MW	9.5" TFT	350MB/8MB RAM/14.4 Kbps	\$2,399
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Ready 5010	Intel® i486 DX4/100MHz	540MB	8MB RAM	\$1,599
Ready 7022	Pentium® 75MHz	1.08GB	8MB RAM	\$1,799
Ready 9022	Pentium 100MHz	1.08GB	8MB RAM	\$2,099
Ready 9522	Pentium 100MHz	1.8GB	16MB RAM	\$2,499
Ready 9532	Pentium 120MHz	1.8GB	16MB RAM	\$2,799
Ready 9542	Pentium 133MHz	1.8GB	16MB RAM	\$2,999
Ready PowerPlayer LE	Pentium 133MHz	1.8GB	16MB/6XCD	\$3,299

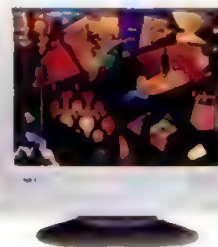
Model	Processor	HD	Memory	Price
PowerMate V406	Intel i486 DX2/66MHz	540MB	8MB RAM	\$1,199
PowerMate V75	Pentium 75MHz	540MB	8MB RAM	\$1,499
PowerMate V90	Pentium 90MHz	540MB	8MB RAM	\$1,599
PowerMate V100	Pentium 100MHz	540MB	8MB RAM	\$1,699
PowerMate P120	Pentium 120MHz	1.2GB	16MB RAM	\$2,499
PowerMate P133	Pentium 133MHz	1.2GB	16MB RAM	\$2,749

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Ultra 17	006153	\$245
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SyncMaster 150B	005274	\$195
SyncMaster 170B	005273	\$205
SyncMaster 170L	005272	\$205
SyncMaster 200L	004524	\$260

Sony Multiscan 15sf1	004742	\$475
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ViewSonic 14ES	005588	\$275
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15GS	005738	\$280
17GA	005739	\$335
17GS	005738	\$285
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Multimedia Kit	005841	\$35
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Ethernet Combo PCMCIA Adapter	005189	\$130
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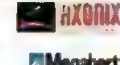
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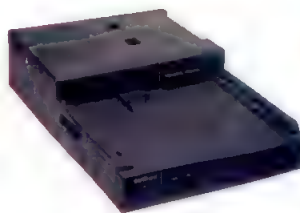
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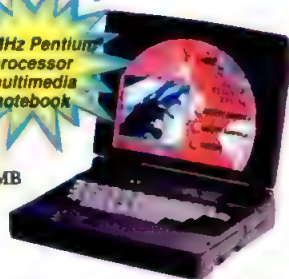
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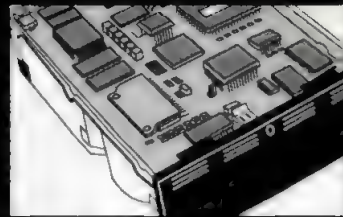
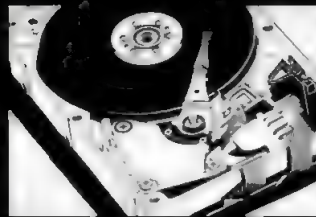
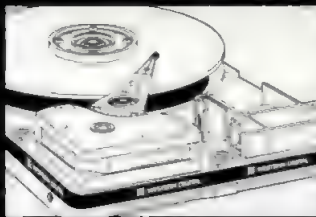
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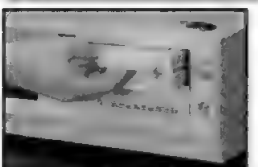
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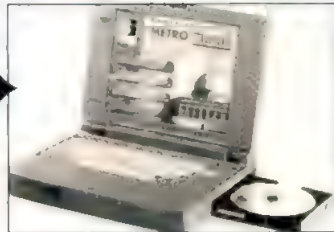
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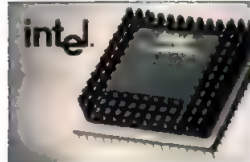
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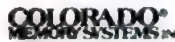
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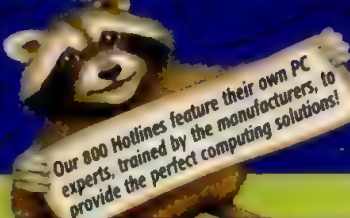
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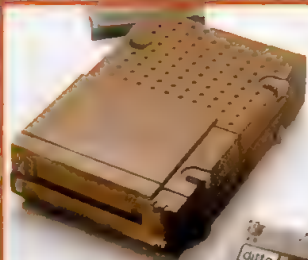
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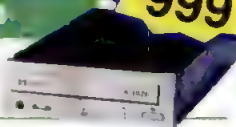
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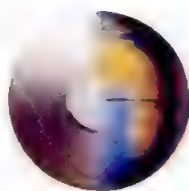
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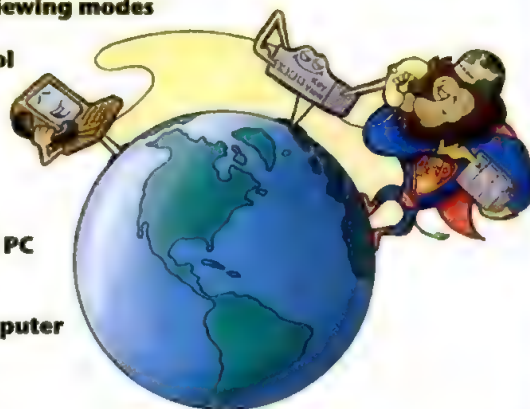
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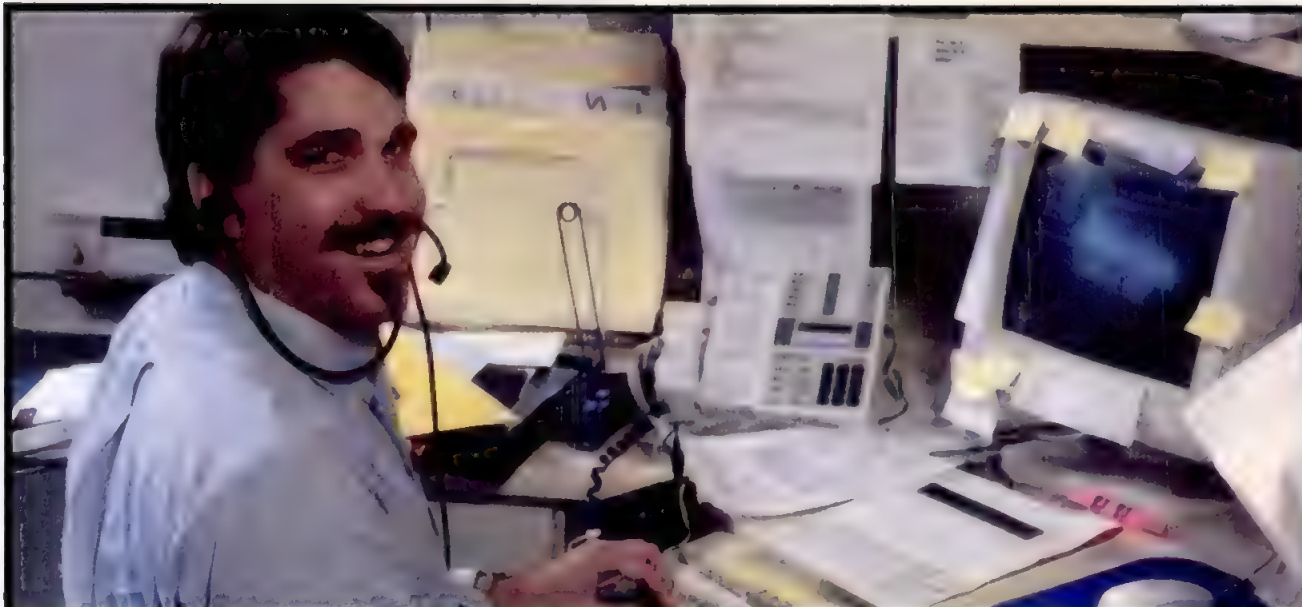
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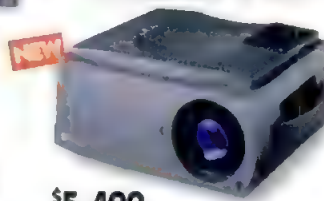


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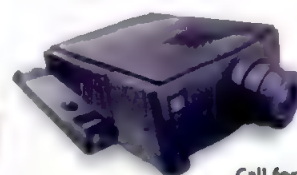
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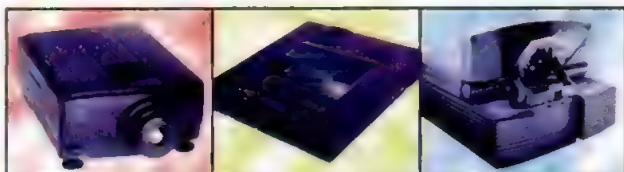
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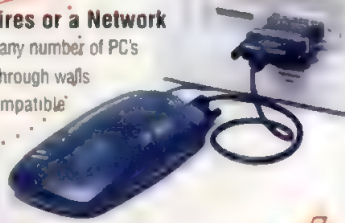
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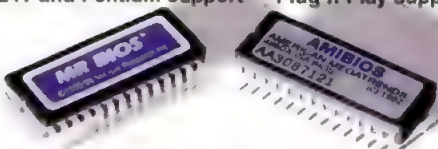
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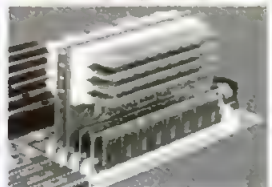
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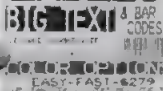
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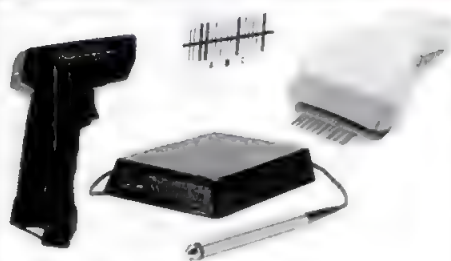
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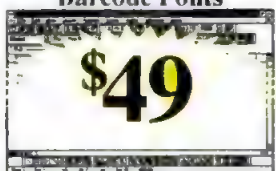
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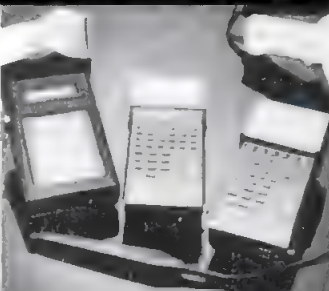
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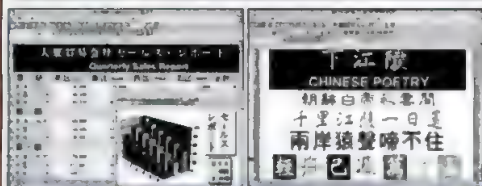
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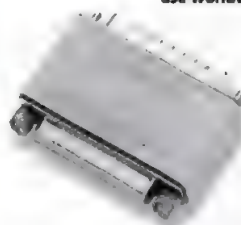
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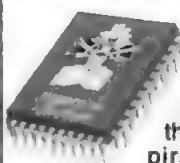
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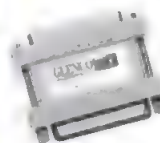
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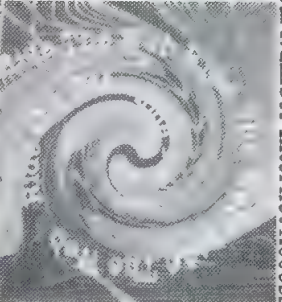
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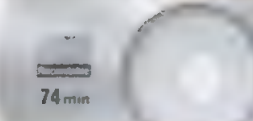


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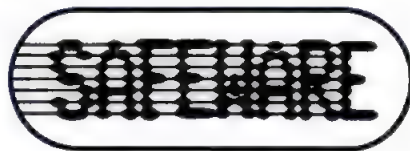
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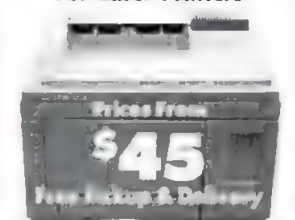
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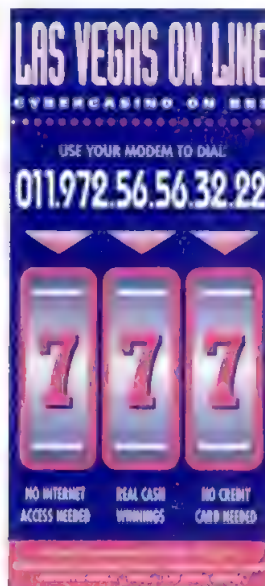
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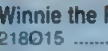
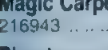
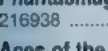
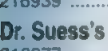
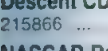
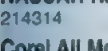
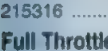
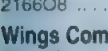
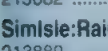
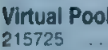
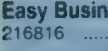
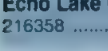
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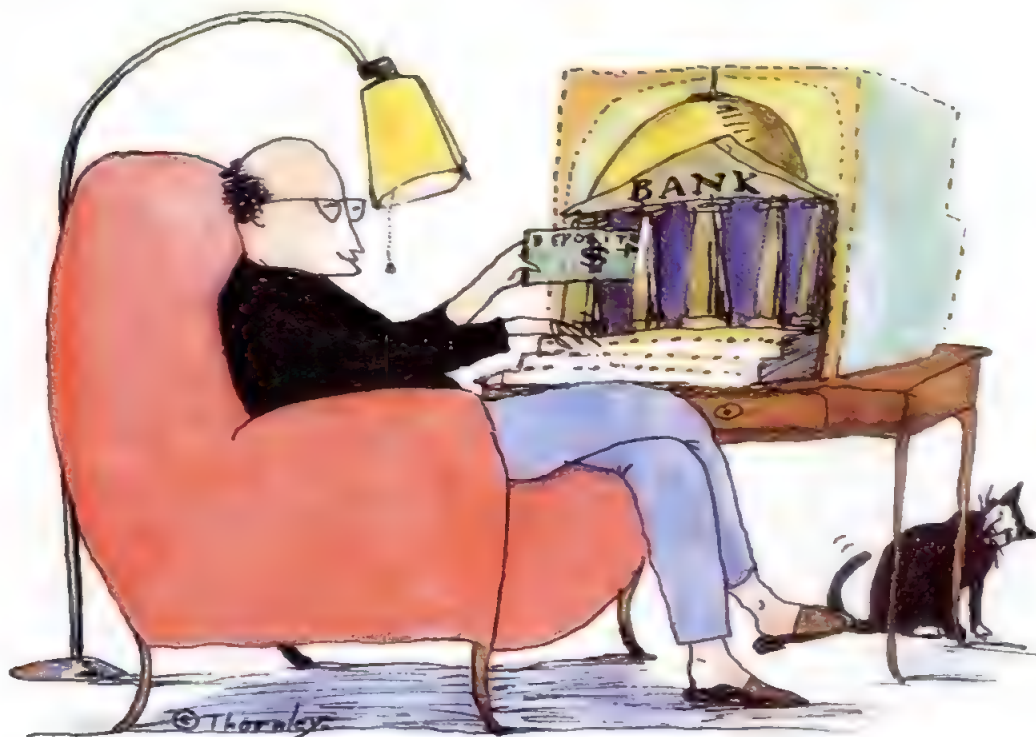
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At Home

A SPECIAL REPORT ON PRODUCTS FOR THE PERSONAL SIDE OF COMPUTING



Personal Finance: Banking on Your PC

By Kathy Yakal

Finances scare us. Our fortunes change as often as the weather, and we frequently feel as if our monetary destinies extend beyond our control. Full-service banks help, of course, but accessing them after 3:00 P.M. remains a problem, and even your "personal banker" can't chat with you at a moment's notice.

Personal finance software has been helping us make sense of our finances for almost a decade now, goading us to empty those shoeboxes full of receipts and to reconcile our illegible checkbooks electronically. In their lat-

est iterations, these applications have finally become the banking "friends" we've been wishing for: ready at any hour of the day to manage our finances on the PC and reach into our banks electronically to help us track, bud-

get, move, and even spend our money.

Since we last covered personal finance programs ("Personal Finance: Seize Control of Your \$\$\$," January 10, 1995), most packages have been revised, but only two have upgraded substantially. The changes in Intuit's Quicken Deluxe 5 for Windows and in Microsoft Money for Windows 95 represent the three most important trends in personal finance software today: better external connections, sharper interfaces, and educational resources.

Microsoft probably expects that its new operating system will also turn into a trend: Money runs solely on Windows 95. Quicken, however, operates on Windows 3.1 as well as on Windows 95, and Intuit has also released DOS and Macintosh versions of the product. Keep in mind that if you need

to import data from one program to another, only Quick- en and Microsoft Money im- ported our sample data (.QIF files) completely; the other three products we reviewed for this story fell short in this capacity.

VIRTUAL MONEY EXCHANGE

Personal finance managers have performed limited elec- tronic banking chores for years. You could send bill pay- ment information over a modem to the well-known CheckFree or BillPay USA electronic bill-payment ser- vices, and they would write and dispatch your checks.

In an early-1994 version of Money, Microsoft pioneered the concept that home bank-

IN THIS REVIEW

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ing could go beyond the abili- ties of bill-paying services: Users could perform numer- ous banking chores (transfers, account reconciliation, and the like) via a PC. Today, 21 U.S. banks participate in Mi- crosoft Money's electronic connections. Intuit entered the fray with its fifth version of Quicken and formed part- nerships with almost as many banks. Internet banking may

take longer to establish, as se- curity remains a concern. In the first half of this year, Intuit plans to offer bill-paying ser- vices with Quicken's partici- pating banks through Ameri- ca Online.

CHANGING FACES

Designing interfaces can cre- ate headaches for financial software developers: They know their product must ap-

pear appealing to users, oth- erwise no one will engage in their money management program. Accordingly, nearly every product we've evaluat- ed in this review attempts to ease you in. Managing Your Money Plus 2.0's SmartDesk opening screen gives you a recognizable launch pad for easy navigation. Kiplinger's Simply Money 2.0's icon- based display serves a similar function. But plain, unintu- itive MoneyCounts for Win- dows 9.0 disappointingly makes no special interface statements and, frankly, needs a major overhaul.

The biggest changes in in- terface design can be found in Microsoft Money and Quick- en Deluxe. Money, which never sold or performed as well as Quicken, now com- petes nicely with its new, ex- clusively Windows 95 edition. An efficient, streamlined interface makes the program ideal for first-time users. Intuit had even a bigger chal- lenge with Quicken, but the company managed to build a cohesive and understandable interface that leads the way to almost 550MB worth of multimedia features—both video and audio—and pro- gram data.

MORE LEARNING TOOLS

Just because you may have a viable way to manage fi- nances doesn't mean that you'll always know what money moves suit you best. So personal finance software designers continue to build more advice into their pro- grams. Simply Money's Advi- sor, for example, continuo- usly monitors your finances and suggests what decisions or changes to make. And Man- aging Your Money has always included personalized advice from program designer and fi-

HIGHLIGHTS

Two Approaches May Make a Right

Two companies in our evaluation, Intuit (Quicken Deluxe 5 for Windows) and Microsoft (Microsoft Money for Windows 95), took quite different—yet almost equally effective—approaches for their product interfaces. Both vendors set good examples for how the best personal finance tools should be designed.

Microsoft Money's sparse menu system belies the financial processing power within the program.

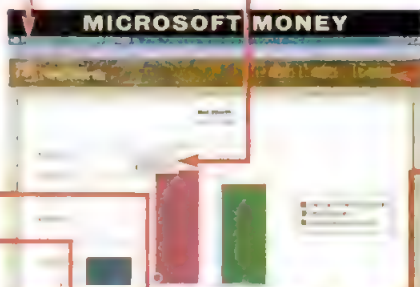
Microsoft Money economizes screen space in many ways. Click- ing on a chart column brings up the dollar amount it represents.

You don't see anything you don't have to in Microsoft Money. Here, your customization options are hidden off-screen until you need them.

Moving quickly to a related screen in Microsoft Money is made easy by navigational buttons such as this toggle switch between reports and charts.

Quicken uses these QuickTabs so you can have several windows open at once without having to manage overlapping screens.

More navigational icons give you fast access to the Feature Explorer (an alter- nate navigational aid) and the Deluxe- Gateway, your passport to key features in the CD-ROM.



These three buttons are ever-present in Microsoft Money. They let you see a list of the main program areas, move back one screen, or return to the opening screen.

Quicken's customizable toolbar and extensive drop-down menus help you find the numerous tools that are available.



These buttons appear on many screens throughout the program to give you quick access at all times to frequently used commands.

The heart of Quicken's Home-Base is this set of easily recognized navigational icons.

nancial expert Andrew Tobias. CD-ROM editions have also enhanced advice-giving: Quicken Deluxe, for instance, includes special interactive sections—such as Ask The Experts and Finance 101—that tailor financial advice to your specific situation.

These extras aside, personal financial management tools remain the bread and butter of these programs. Each package we reviewed has its own style, level of detail and flexibility, and degree of navigational ease. Ultimately, your future—financial and otherwise—hinges to some extent on unforeseen and uncontrollable events. But any one of these personal finance software products can at least provide you with a map to help guide you along the financial road that runs beside the uncharted highway of your life.

4Home Productions

Kiplinger's Simply Money

Kiplinger's Simply Money 2.0, from 4Home Productions, is much the same product it was the last time we reviewed it (when it went by the name Kiplinger's CA-Simply Money). You can still set up accounts and process transactions easily, and the package continues to handle investments and reporting adequately. In addition, the expert financial advice—provided throughout the program by Kiplinger editors—still benefits both novice and experienced users alike. But compared to its peers, the \$69.95 Simply Money has fall-

Quicken Deluxe 5 for Windows

Short of making visits to your bank or consulting with your own financial advisors, nothing can compete with the guidance you'll find in our Editors' Choice for personal finance software: Intuit's Quicken Deluxe 5 for Windows.

Built on a solid foundation of intelligent tools, Quicken makes the electronic management of your banking matters a virtual snap. Intuit borrowed the EasyStep account setup aid from TurboTax and successfully added it to Quicken, which even manages to help ease the stress of tax time. No product reviewed here can match the smooth finance-to-tax-time transition provided by Quicken and its Tax-Link assistance. Other noteworthy enhancements include EasyAnswer Reports, the new HomeBase, and better investment tracking. And with the most intelligent multimedia advice of any of its competitors, Quicken "Deluxe" more than earns its name.

Though Intuit was the first personal finance software developer to introduce its own credit card nearly three years ago, the company played a bit of catch-up with its closest rival, Microsoft Money, this time around. In 1994, Microsoft announced a number of partnerships with banks across the U.S. to establish electronic banking connections and, consequently, made Intuit look a little slow on the uptake. A year later, Intuit has rectified the situation and

now has an equally impressive number of partnerships with banks.

Microsoft surprised us with Money for Windows 95. Instead of featuring megabytes of financial advice or an orchestra of bells and whistles, the program focuses on simplifying the process of managing your finances on a PC. Money for Windows 95 succeeds and earns an honorable mention here.

Bear in mind, though, that Microsoft's path to better software leads only one way. Unlike Quicken, there's no Windows 3.x companion upgrade for this Windows 95-only application. If you're currently using Money 3.0, you'll have to upgrade your OS before you can upgrade to Money 95.

As for the rest of the pack, Kiplinger's Simply Money and Managing Your Money Plus are each worth a look, but we don't recommend switching to either one of them from another product—unless that other product is MoneyCounts for Windows. Parsons Technology, Intuit's subsidiary and the maker of MoneyCounts, won't comment on the product's future, so neither will we.



en behind and misses the mark in many areas.

A DIFFERENT LOOK

Personal finance products normally tuck away account and income/expense lists, producing them only when necessary. Simply Money takes the opposite approach. Every account, income source, and payee is represented on the opening screen by a "heading" icon.

You can establish up to ten of these finance groups ("John's account" and "Mary's account," for example) and create a different "subset" of icons if you want completely separate home and business books. Simply Money provides a dialog box that outlines the setup process for finance groups. And if you choose to import Quicken (.QIF) files, representative icons will pop up automatically.

All these finance groups serve as more than quick-access buttons to files, because they're also navigational aids. For example, if you drag a payee icon to the check-writing button at the bottom of the screen, a blank check will appear with the payee's information already completed. 4Home Productions was one of the first software companies to use drag-and-drop so effectively.

Our Contributors: THERESA W. CAREY and KATHY YAKAL are frequent contributors to *PC Magazine*. LANCE N. ULANOFF was the senior associate editor in charge of this story, BEN Z. GOTTESMAN was the technical director, and DAN SMITH was the associate project leader.

SIMPLE ADVICE

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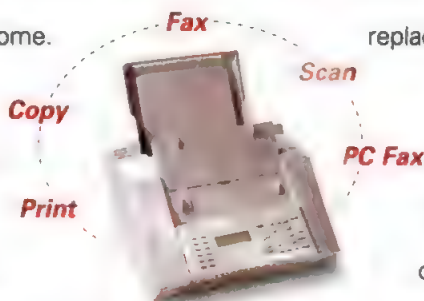
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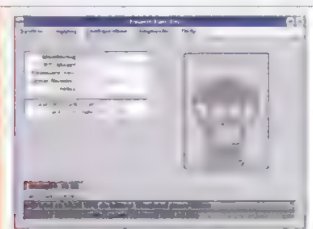
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REPORT CARDS

Personal Finance Software

These task ratings compare personal finance managers on their ability to track all aspects of a user's finances, from data entry and reporting to analysis and advice. We split tasks into five categories: checkbook management, budgeting, tax and financial planning, portfolio management, and electronic connections. The grades we used and their meanings are as follows: A—significantly above average; B—above average; C—average; D—below average; F—failing.

Checkbook management is the core of every personal finance manager. These programs should: assist users in setting up accounts; fully automate the process of writing and recording income and expenses; remember recurring transactions; and handle a variety of data entry chores. They should also aid account reconciliation and allow users to edit and add transactions from within the reconciliation module.

which offers new-user help and warns you when scheduled transactions are approaching. It monitors spending trends and alerts you when a recurring payment has been missed, or when a regular payment seems too high or too low. Most important, Advisor watches your financial activity and will make customized suggestions.

Those distinguishing features aside, Simply Money's main transaction processing and reporting characteristics are of average quality. The check-writing screen uses a

very low-resolution graphic to display a rather unclear check that uses only basic conventions for PC check-writing. Type a letter, and the list of payees appears. Choose one, and the details of the last transaction with that payee pops up. You can split transactions among several categories and jump to numerous tools, such as a notepad or a scheduling box, via on-screen icons. You can also enter checks, ATM withdrawals, and other transactions from the register screen. And although Simply Money

Finally, these products should provide reports and charts to help users track their financial status.

A good **budgeting** module can help users spot unusual spikes in spending and income, and find expenses that are ripe for cutting. These programs should be able to create budgets of varying levels of detail, based upon data from prior years. And they should allow users to sort income and expenses by category, set spending and earnings objectives, and produce detailed reports.

Once users have collected all this data, it's good to have some help with **tax and financial planning**. The better finance managers help users figure out their tax liability throughout the year, thus enabling them to take actions that can reduce their tax burden. Programs should also provide tools for calculating loan payments.

The logical extension of checkbook management is **portfolio management**. A package should be able to track a variety of investments, differing transaction types, and investing goals. It should also let users set goals and should help them with decision-making.

Personal finance packages should have **electronic connections** directly to banks or to bill-paying services such as CheckFree and BillPay USA, so that users can prepare checks and transactions for the future, and set up recurring payments. These packages should also allow users electronic access for examining checking, savings, and credit card account balances 24 hours a day; reconciling accounts at any time; and transferring money. In addition, users should be able to download (from the Internet or an on-line service) the latest prices for stocks, bonds, and mutual funds.

has not yet implemented its own electronic banking service, you can use CheckFree and BillPay USA to pay bills.

Two important elements of personal finance, budgeting and bank reconciliation, rank similarly to transaction processing. The features Simply Money offers work fine and may satisfy users, but the package still

lacks the extras found in today's best personal finance programs.

For example, you can mark and edit transactions during a reconciliation, but there's no error-trapping.

REPORT CARD

Kiplinger's Simply Money

Checkbook management	C
Budgeting	C
Tax and financial planning	B
Portfolio management	B
Electronic connections	C
Overall value	C

SUMMING IT ALL UP Simply Money offers a generous number of reports and graphs—more so than any other package reviewed here—but you can't drill down to view

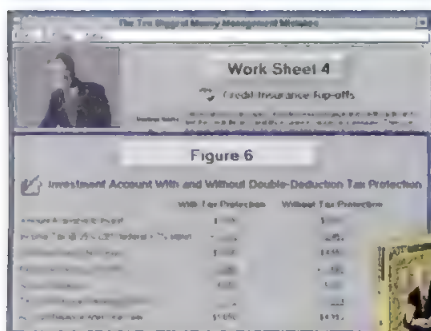
Finance Fundamentals

Here's a collection of useful finance-oriented software specialties. Though they won't balance your checkbook or pay your bills, they all offer tools

that help you organize your finances, invest in the future, or steer you in the right financial direction.

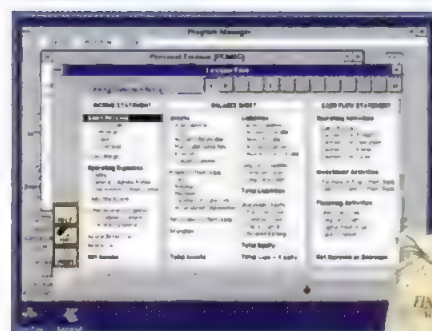
—Theresa W. Carey

Charles J. Givens Money Guide, by Friendly Software Corp.



Mr. Givens, the author of several financial management books, instructs you on how to get your financial house in order. The \$39.95 program includes: Wealth Management, 10 Biggest Money Mistakes, and "Ask Charles J. Givens." (800-968-4654, 419-868-6090.)

Financial Competence, by Competence Software Inc.



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supporting transactions. The program also provides eight individual financial calculators to help you plan for future events like retirement. But tax preparation aids are minimal: You can assign transactions to IRS forms and schedules, but you can't estimate tax liability. And although its portfolio-management capabilities can't compete with those found in Managing Your Money, Simply Money does a respectable job of tracking and updating your investments.

Overall, though, Simply Money lacks the depth of application and the features—such as built-in electronic banking, multiyear budgeting, report drill-down, and a state-of-the-art interface—found in

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Managing Your Money Plus

Managing Your Money Plus 2.0 (floppy disks, \$79.99; CD-ROM, \$99.99) has had a tumultuous year. Its publisher, MECA Software, was purchased by H&R Block, which formed a new subsidiary called Block Financial Software. Some 18 months later, Block sold Managing Your Money to a consortium of banks headed by NationsBank Corp. and Bank of America.

The new owners plan to customize special versions of MYM for contracted banks. These versions will each link to the specific contracted bank only. Since our review last year of it, however, MYM has advanced to a CD-ROM "Plus" version, and an interim upgrade of the retail nonbank version is expected by the time you read this.

There are three ways you can navigate through the program's features: the standard menu, the toolbar, and the optional SmartDesk—an inter-

face that resembles an office with shelved reference books and labeled desk drawers. A click on the drawer labeled "Tax," for example, will produce an estimate of your taxable income for the year. MYM offers three basic account templates: home, business, and both combined. You can set up main categories (such as "Utilities"), and then create subaccounts within those groups (such as "Telephone").

If you're converting from another program, MYM imports data in Quicken's .QIF format, though you have to import the transactions for each account one at a time. Unfortunately, though, MYM's import function misclassified several of our investment accounts.

CHECKBOOK MANAGEMENT

MYM has a flexible and elegantly formatted checkbook. You can choose from eight types of transactions (including print check, deposit, and ATM) and split a single transaction across categories. You can link to CheckFree or MYM-Pay for electronic bill payment.

Setting up a new loan account is simple. MYM can

REPORT CARD

Managing Your Money Plus

Checkbook management	B
Budgeting	C
Tax and financial planning	A
Portfolio management	B
Electronic connections	C
Overall value	B

amortize a loan and will allocate the payment correctly among the principal and the interest. The fairly well-designed checkbook reconciliation lists all uncleared transactions, provides a running tally of cleared checks (to keep you up-to-date on the

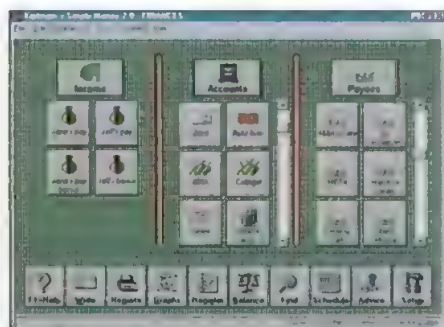
accuracy of your account balance), and lets you suspend the reconciliation process so you can come back and complete it later.

REPORTS, GRAPHS, AND MORE

You can analyze just about every aspect of your financial health with MYM's reports and graphs. Selecting accounts, categories, and time periods to include in our reports was no problem, and we were able to make changes upon viewing a selected report.

MYM's budgeting capabilities are adequate. You can enter an annual figure and then hit the Spread button to reach a 12-month calculation automatically. The package also provides two reports that allow you to compare the budget with the actual.

MYM does an excellent job of classifying expenses by tax category. Once you've entered budget figures for all tax cate-



Simply Money offers a method for displaying income sources, accounts, and payees.

today's personal finance software leaders.—Kathy Yakal
Kiplinger's Simply Money 2.0. List price: \$69.95. Requires: 4MB RAM, 6MB hard disk space, Microsoft Windows 3.x or later. 4Home Productions, Islandia,

Government Giveaways for Entrepreneurs, by InfoBusiness Inc.



This \$49.95 CD-ROM could be subtitled "How to work with the government instead of against it." Video clips contain advice ranging from how to start your own business to how to find and buy cheap stuff from government agencies. (800-657-5300, 801-221-1100.)

Prosper, by Ernst & Young LLP



This \$59 program for Windows includes specialized advice prepared by the financial experts at Ernst & Young. It also provides numerous goal-setting and financial calculators, such as Education Goals, Home Purchase Goals, and Lease Vs. Buy a Car. (800-277-6773.)

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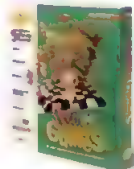
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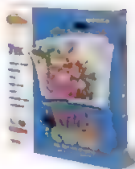
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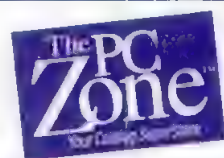


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gories, the Tax Summary report shows actual expenses to date as well as a year-end projection of your tax liability. Though you can't print tax re-

folio transactions and letting you log onto CompuServe to update security values. (You have to know the ticker symbol, though; there's no lookup capability.) But other products, such as Intuit's Quicken, have caught up in this area.

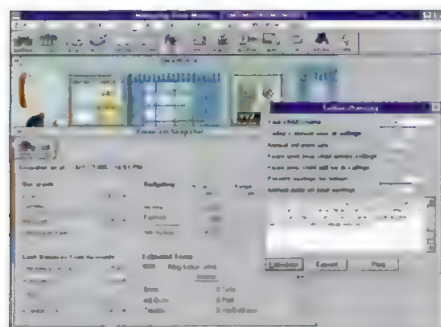
ELECTRONIC CONNECTIONS

Promises, promises. Yes, MYM lets you conveniently pay bills electronically, and you can

download stock quotes and price histories from CompuServe directly from the program. But electronic banking and links to credit cards don't exist yet in MYM. Still, if you've always used MYM, this current version will probably satisfy you. We see no compelling reason, however, for you to choose MYM over one of its more able competitors.—Theresa W. Carey

Managing Your Money Plus 2.0. List price: Floppy disks, \$79.99; CD-ROM, \$99.99. Requires: 6MB RAM, 14MB hard disk space, double-speed CD-ROM drive, Microsoft Windows 3.x or later. MECA Software L.L.C., Fairfield, CT; 800-288-6322, 203-256-5000; fax, 203-255-6300.

Circle 449 on reader service card



Managing Your Money's icon-oriented interface provides easy access to your daily finances.

turns directly from the program, you can easily export tax data to .TXF format, which can be read by all the major tax preparation programs on the market.

For financial planning, MYM's SmartDesk interface provides easy access to calculators that assist in goal planning, insurance recommendations, mortgage affordability, tuition forecasting, and some very basic retirement planning. On the CD-ROM, you can listen to financial expert Andrew Tobias talk extensively about creating a secure financial future.

For years, MYM's strong portfolio management surpassed those of other personal finance packages. It remains flexible, taking into account most standard port-

Getting into the Act: Banking Software



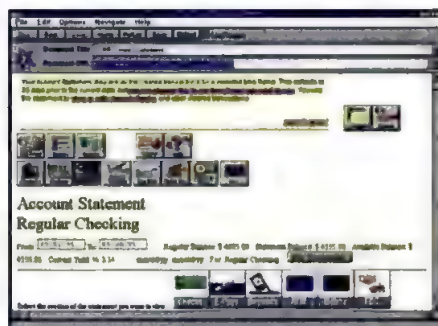
By Theresa W. Carey

Next time a floppy disk arrives in your mailbox, it might not be from America Online. It could be from your bank.

A couple dozen banks have announced their intention to forge links with PCs to allow you to make transactions through a personal finance program, be it Quicken, Microsoft Money, Managing Your Money, or the bank's proprietary software. NationsBank, one of the owners of Managing Your Money, will have a version of MYM (\$10; basic service, \$3.95; basic and bill paying service, \$9.95) available to customers by the first quarter of 1996.

This is an image-conscious move for NationsBank (800-933-6262), which already has customers in Texas with on-line access to their accounts. "Our current software is ugly," says Cynthia Montgomery, a senior vice president of NationsBank. "It looks like a main-frame screen."

The branded version of MYM will act as a front end to the bank's proprietary back-end systems and will also have lots of advice built in, including pointers to actual human beings—business-loan officers, for example—at NationsBank.

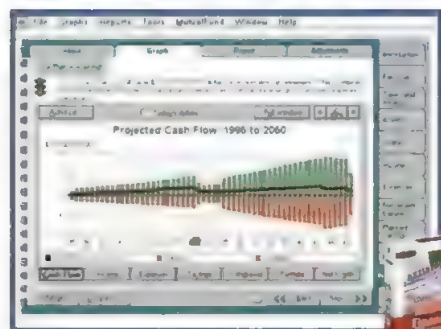


The check register is a major electronic banking feature found on Citibank's Web page.

BANK-WARE

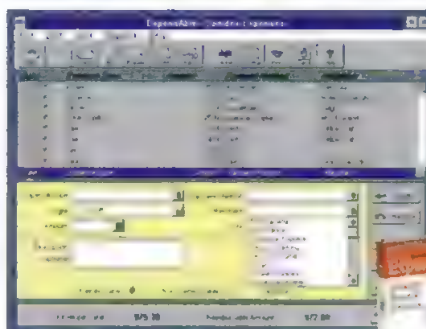
Citibank (800-967-2300) is promoting its own software that links customers with on-line banking as well as securities trading. The bank offers a demo on the Web at <http://www>

Quicken Financial Planner, by Intuit Inc.



Jane Bryant Quinn provides answers and advice regarding future finance woes in this \$39.95 multimedia planning guide. QFP includes the Morningstar Mutual Fund database and easy-to-use tools to help you put together a retirement plan. (800-816-8025, 415-322-0573.)

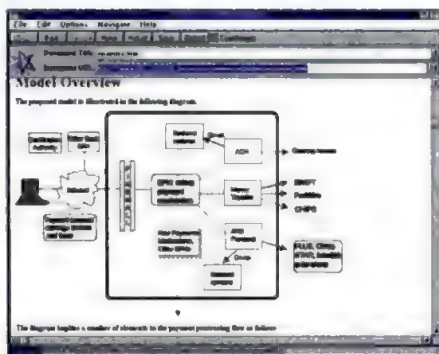
Quicken ExpensAble, by Intuit Inc.



If you're familiar with Quicken's drop-down lists and QuickFill capabilities, ExpensAble (\$49.95) should be a snap to use. You can exchange data with Quicken and create custom reports according to your company's standards. (800-816-8025, 415-322-0573.)

[.citibank.com/california/index.html](http://citibank.com/california/index.html). The on-line service is available free to Citibank customers who reside in California, Florida, Illinois, Maryland, Nevada, New York, and Washington, DC. This attractive and very easy-to-use software has push-button access to all the features.

If you're worried about the security of Citibank's software—or that of any on-line banking service in general—you're not the only one: Many people avoid on-line banking altogether because they wonder, "Can someone else get in and guzzle the funds out of my accounts?" The banks offering on-line services claim they have great security schemes in place and that their software supports superior encryption. Check out the status of the Electronic Payments Security Project next time you're on the Web at <http://www.llnl.gov/fstc/projects/commerce/public/epaydes.htm>.



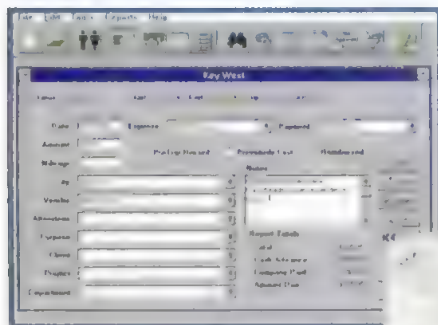
You can find the Electronic Payments Security Project on the World-Wide Web.

WEB BANKING

At press time, Security First Network Bank (800-736-2321, 404-679-3200) announced the impending availability of their on-line transaction service, which would involve little more than a copy of Netscape on your computer—no other software is required. Security First plans to offer banking services nationwide—20 free bill payments per month, 200 free checks to start, and 50 cents per bill payment—to anyone with a modem and a Web browser. Check out their FAQ page at http://www.sfnb.com/faq_h.html.

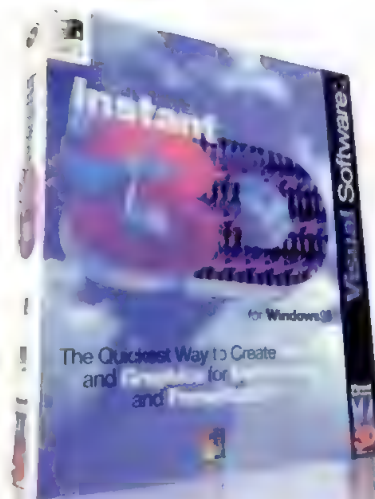
These on-line banking services will let you inquire about account balances, transfer money from one account to another, pay bills, and, in some cases, buy and sell securities. Too bad they can't issue cash via your color printer yet.

Expense It! Gold, by On The Go Software



Though it can run as a standalone expense tracker, Expense It! Gold (\$49.95) is aimed more at large companies that share data over a network. A remote function allows employees in the field to synchronize their data with the main system in the home office (619-546-4340).

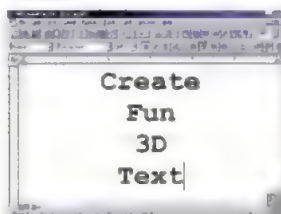
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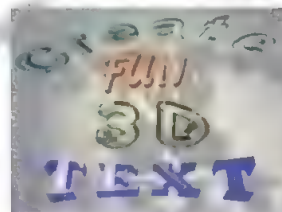
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SOFTWARE

Personal Finance

Microsoft Corp.

Microsoft Money for Windows 95

Simplified, streamlined, and serene: Welcome to Microsoft Money for Windows 95 (street price \$34.95), available on floppy disk or CD-ROM. Rather than try to compete with Quicken's extensive set of features, Microsoft has pulled in the reins to focus and refine the most frequently used personal finance tools: bank account and bill management, reports and charting, and simple investment administration.

In early 1994, Microsoft was the first software company to offer electronic banking through a personal finance package. Money's new, more accessible interface and greater number of participating financial institutions improve upon its original electronic concept.

Both current and new users will likely appreciate some of the package's many graphical changes (such as the sharp navigational icons and the background marbling effect), although old hands may miss the blank-check graphic. Microsoft Money's easy operation and tightly focused em-

phasis on home use make it a good choice for someone who doesn't process business-related transactions and is comfortable without lots of financial advice. Keep in mind, though, that Microsoft Money can run only on Windows 95.

MONEY MAP

Money's new opening screen exemplifies Microsoft's revamped approach to personal finance. The program divides

its operations into key tasks, such as the Report and Chart Gallery, Online Services, and Account Register. The new Chart of the Day appears on this screen too. Here, you can toggle between five basic financial charts or have a different

chart appear automatically every day.

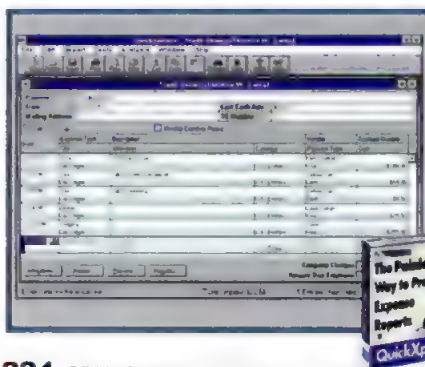
Money's new Payment Calendar provides a great framework for bill planning. You enter data about regularly occurring payments, transfers, and deposits, and then see how this data will affect your account balances. And whenever you need any sort of help, Money's Wizards offer a simple solution. These step-by-step dialog boxes walk you through each process. The program also includes five fi-

REPORT CARD

Microsoft Money for Windows 95

Checkbook management	A
Budgeting	A
Tax and financial planning	C
Portfolio management	B
Electronic connections	A
Overall value	B

QuickXpense, by Portable Software Inc. (continued)



A trial version of this well-designed \$99.95 program is available on the Internet at <http://www.quickxpense.com>. QuickXpense offers reimbursement forms for more than 2,000 companies.

It even includes a link to General Electric Capital's MasterCard. (800-478-7411, 206-637-8808.)

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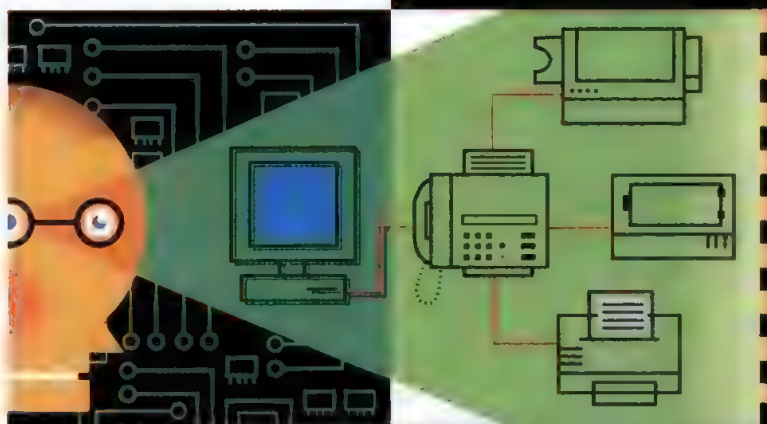
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SUMMARY OF FEATURES

Personal Finance Software

Continues



■ YES ■ NO

Products listed in alphabetical order

	Kiplinger's Simply Money 2.0	Managing Your Money Plus 2.0	Microsoft Money for Windows 95	MoneyCounts for Windows 9.0	Quicken Deluxe 5 for Windows
Price	\$69.95 (list)	\$99.99 (list)	\$34.95 (street)	\$89.00 (list)	\$59.99 (street)
General Features					
Operating system	Windows 3.x or later	Windows 3.x or later	Windows 95	Windows 3.x or later	Windows 3.x or later
Calculator/Calendar	■ ■	■ ■	■ ■	■ ■	■ ■
Toolbar	■	■	■	■	■
Customizable	N/A*	■	N/A*	■	■
Sample data	■	■	■	■	■
Context-sensitive help	■	■	■	■	■
Automatic on-screen help	■	■	■	■	■
On-line tutorial	■	■	■	■	■
Number of sample income templates	3	3	1	5	3
Number of sample expense templates	3	3	1	5	3
Offers financial advice based on user input	■	■	■	■	■
Import data formats	BMF, QDT, QIF	MIF, QIF	QIF	MIF, QIF	QIF
Number of account types available	10	8	11	14	8
Maximum number of subcategories	4	1	1	N/A**	4
User can view register and check forms simultaneously in the same window	■	■	■	■	■
Memorizes recurring transactions	■	■	■	■	■
Schedules future transactions	■	■	■	■	■
Offers electronic banking	■	■	■	■	■
Reconciles account	■	■	■	■	■
Links to electronic credit card statements	■	■	■	■	■
Bill Payment					
Provides bill-payment reminders	■	■	■	■	■
Bill-paying-service links	BillPay USA, CheckFree	CheckFree, MYM-Pay	Pay On-Line	CheckFree ¹	CheckFree, Intuit Financial Services
Prints laser, ink jet, and dot matrix checks	■	■	■	■	■
Budgeting Features					
Preset, modifiable budget categories	■	■	■	■	■
Splits transactions among categories	■	■	■	■	■
Forecasts future cash flow	■	■	■	■	■
Automatically sets up budget account based on prior year's input	■	■	■	■	■
Multiyear budgeting	■	■	■	■	■
Reports					
Number of predefined reports	37	25	26	32	28
User can customize existing report formats' content/appearance	■ ■	■ ■	■ ■	■ ■	■ ■
Creates instant reports from transactions	■	■	■	■	■
User can view supporting data from report view	■	■	■	■	■
Graphs and Charts					
Number of predefined charts	31	7	20	27	5
User can customize existing chart formats' content/appearance	■ ■	■ ■	■ ■	■ ■	■ ■
User can view supporting data from chart view	■	■	■	■	■
User can view multiple charts simultaneously via an icon or a menu option	■	■	■	■	■
Supports 3-D charts and graphs	■	■	■	■	■
Portfolio					
Allows multiple views of portfolio	■	■	■	■	■
User can customize views	■	■	■	N/A*	■

N/A*—Not applicable: The product does not have this feature.

N/A**—MoneyCounts does not use categories; it uses a traditional ledger format instead.

1—MoneyCounts can only read CheckFree data; it cannot export data to CheckFree within the program.

financial calculators, including ones for retirement savings and loan payments.

A TRANSACTION A DAY...

Microsoft Money presents the smoothest, least confusing navigational system we've seen in any personal finance product. In this new version, Microsoft decreased the number of dialog boxes, eliminated the toolbar, and reduced the number of menus. Accordingly, most mouse clicks take you to a single full-screen window, so you don't get tangled up in multiple layers. Three icons in the upper-right corner will take you everywhere: The Go To icon drops down a list of Money's program areas. The Back icon takes you a step backward. And the Contents icon brings you to the opening screen. You'll also find right-mouse-click menus.

Money's default screen now has both the account register and form on the same screen in order to streamline transaction processing. You can pull down submenus and toggle between accounts and views (by date, number, and the like). And you can access account details and the reconciliation screen by clicking small bar-shaped icons.

There are 26 highly customizable reports and 20 similarly flexible charts that give Microsoft Money a bit of an edge over Quicken—unless you need some business-oriented readouts. So in straightforward personal finance, Money stays abreast of the field, but it falls behind in some areas of tax planning and portfolio management. You can categorize transactions as tax-related, print tax reports, and export data to a major tax program, but you can't print early forms and schedules, or get advice on tax

SUMMARY OF FEATURES

Personal Finance Software

Ends

PC MAGAZINE
EDITOR'S CHOICE

■ YES ■ NO

Products listed in alphabetical order

	Kiplinger's Simply Money 2.0	Managing Your Money Plus 2.0	Microsoft Money for Windows 95	MoneyCounts for Windows 9.0	Quicken Deluxe 5 for Windows
Supports multiple portfolios	■	■	■	■	■
Tracks investments beyond stocks, bonds, and mutual funds	■	■	■	■	■
Number of predefined transaction types	17	11	13	4	18
Links to on-line quote service	■	■	■	■	■
Financial Planning					
Calculates loan-amortization tables	■	■	■	■	■
Number of financial-planning calculators	8	13	5	1	5
Offers debt management based on user input	■	■	■	■	■
Loan Tracking					
User can link loan account to checking account	■	■	■	■	■
Automatically splits payments between principal and interest	■	■	■	■	■
Tax Planning					
Estimates tax liability	■	■	■	■	■
Links categories to specific forms and schedules	■	■	■	■	■
User can export data to major tax programs	■	■	■	■	■
User can view and print preliminary forms and schedules	■	■	■	■	■
Business Uses					
Can generate invoices	■	■	■	■	■
Automatically tracks payroll deductions	■	■	■	■	■
Can generate Accounts Payable and Accounts Receivable reports	■	■	■	■	■
Technical Support					
Unlimited free support	■	■	■	■	■
Toll-free telephone support	■	■	■	■	■

savings. For portfolio management, though, Money's basic investment-tracking capabilities will suffice for users who want to record even complex portfolios and update prices on-line.

Microsoft pioneered electronic banking through personal finance software, and

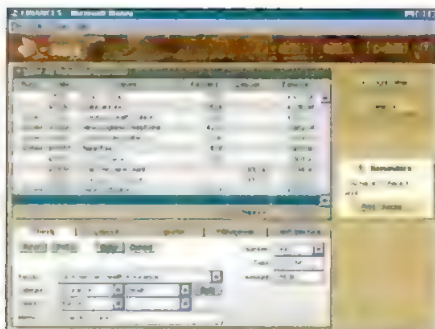
now some 21 major U.S. banks participate in its program. Even if your bank is not one of the institutions working with Microsoft, you can still pay bills electronically through Money, which will cost you \$5.95 per month for the first 20 payments and \$3.50 for each additional

send e-mail to the bank, or pay bills (for an average of \$3 a month). Unlike Quicken, though, Money doesn't feature a Microsoft-specific credit card.

Microsoft Money for Windows doesn't offer all the extra tidbits that exist in Quicken, but its less-is-more style may very well appeal to many users—especially novices—who desire a simple, streamlined way to document their personal finances. —Kathy Yakal

Microsoft Money for Windows 95. Estimated street price: \$34.95. Requires: 4MB RAM, 10MB hard disk space, Microsoft Windows 95. Microsoft Corp., Redmond, WA; 800-508-8458, 206-882-8080; fax, 206-936-7329.

Circle 450 on reader service card



Microsoft Money's check-writing screen may not be as elegant as some of its competitors', but it has the basic required tools.

group of 10 payments. And if you have an account with any of the participating institutions, you have 24-hour access to your financial accounts—so you can obtain account balances and recent statement information, transfer funds, download credit card information,

Parsons Technology Inc.

MoneyCounts for Windows

MoneyCounts for Windows 9.0, from Parsons Technology, a subsidiary of Intuit, is the runt of the litter in this roundup. It has the fewest features, and it isn't even a bargain anymore: Parsons increased MoneyCounts' price by \$60 to \$89. Intuit and Parsons have refused to comment about MoneyCounts' price hike or its future.

MoneyCounts has a bare-bones checkbook. Basic checkbook features, such as memorized transactions and auto-fill, are available, and you can easily switch the transaction view from one line to three. But you can't simultaneously view the register and the check form on one screen unless you open two separate windows.

With MoneyCounts, you have to finish checkbook reconciliation in one sitting; you can't shut down halfway and resume later. If you try to close the reconciliation area with an out-of-balance checkbook, MoneyCounts creates an automatic balancing transaction that makes an entry in a temporary category. So if your account doesn't reconcile, MoneyCounts will just plug in a number that makes it work.

Furthermore, we found that Quicken (.QIF) files imported very slowly into MoneyCounts (the other programs had rates more than six times as fast), and MoneyCounts then mishandled categories, mangled account types, and created very skewed account balances.

LOANS, BUDGETS, OTHER
FEEDBACK

MoneyCounts also falls short in loan management. First, we had to use an external calcula-

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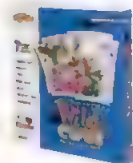
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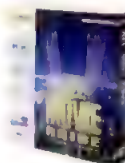
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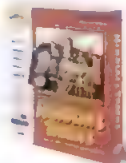
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tor called Interest Vision SE, which is bundled with the program, to figure out the payment on a loan; MoneyCounts doesn't have a built-in amortization calculator. Second, the data didn't transfer directly into the memorized transaction area, so we had to enter it manually. Third, MoneyCounts didn't automatically make the split between interest and principal payoff—another step we had to do ourselves.

MoneyCounts' budgeting features are middle-of-the-road as well. We could enter data for monthly, bimonthly (every two months), quarterly, semiyearly, and yearly budgets. You can also view prior-year actuals while manually entering budget figures for each category. But you can't add or subtract a percentage or dollar amount from prior-year actuals.

MoneyCounts also can't store a custom report format for later recall. We could arrange groups of accounts into "Report Groups," but we couldn't set up a specific type of report—say, comparing the first half of this year and last year—and save it to use again.

DON'T COUNT ON PLANNING

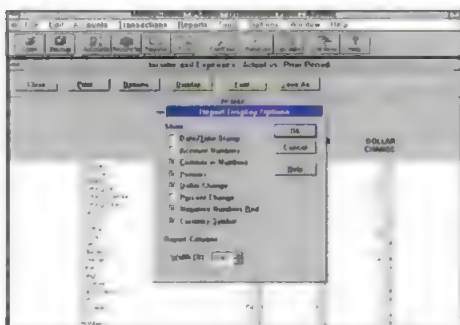
MoneyCounts hardly scores any points in terms of tax

planning, either. The program provides only a summary of potential tax liability based on actual figures, but if you request the summary at mid-year, it won't calculate projected figures to give you an estimate of the annual total.

If you need to plan for the future, don't look to MoneyCounts. It offers no advice or formulas for expenses such as college-tuition funds, a big vacation, or savings for retirement. But you can use the add-on program InterestVision to make some calculations.

MoneyCounts also provides a limited amount of portfolio management. It doesn't give investment advice, but it will handle purchases, sales, reinvestments, and splits—as long as you have an account defined as "Security." Any other kind of asset, such as antiques or jewelry, gets the account type "Other Assets."

Lastly, MoneyCounts' scarce electronic connections prove just how dated Parsons Technology's once-decent



Report displays in MoneyCounts, like most everything else, are functional but not fancy.

REPORT CARD MoneyCounts for Windows

Checkbook management	D
Budgeting	C
Tax and financial planning	D
Portfolio management	D
Electronic connections	D
Overall value	D

package has become. You can import data, such as transactions, from CheckFree, but you can only read them; you can't create transactions directly. No other package that we've reviewed here has shown such scant electronic capabilities—and such shabby features.—Theresa W. Carey

MoneyCounts for Windows 9.0. List price: \$89. Requires: 2MB RAM, 5MB hard disk space, Microsoft Windows 3.x or later. Parsons Technology Inc., Hiawatha, IA; 800-223-6925, 319-395-9626; fax, 319-393-1002. Circle 441 on reader service card

Intuit Inc.

Quicken Deluxe for Windows



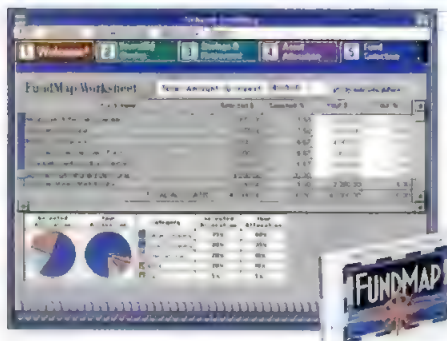
In Quicken Deluxe 5 for Windows, Intuit further expands the boundaries of personal finance software and, consequently, creates a

conspicuous contrast to its sharpened and simplified rival, Microsoft Money for Windows 95. But whereas Money runs only on Windows 95, the 16-bit Quicken runs on both Windows 3.x and Windows 95. (DOS and Macintosh versions are also available.)

Quicken (street price, \$59.99) closes any gaps that may have existed in the prior version, as electronic banking services, new processing capabilities, and interface upgrades now abound in this latest release, which is available on floppy disk or CD-ROM. With an improved HomeBase, in addition to EasyAnswer Reports, more intelligent investment tracking, and the EasyStep account setup aid, a good product is now even better.

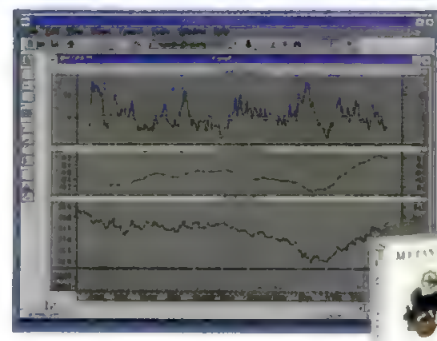
This ambitious reconstruction can, however, cause some potentially significant problems in Windows resource management. In normal usage, Quicken is very resource-intensive—and especially so when it displays charts. We found that the Income/Expense chart quickly consumed an additional 17 percent of GDI resources. In fact, with no other apps running, overall system resources fell to only 31 percent, a dangerously low amount that prevented us from running other applications with comfort.

FundMap, by Charles Schwab & Company Inc.



A walk through basic financial planning concepts ends up in a mutual funds database. Though FundMap (\$25) tries to steer investors mostly in the direction of Schwab-managed mutual funds, its database includes some others as well. (800-334-4455, 415-627-7000.)

MetaStock, for Windows, by Equis International Inc.



The granddaddy of graphical technical security analysis programs is finally available as a Windows application. MetaStock (\$349) is for the serious investor and does a great job of coaching you through setting up and testing a trading system. (800-882-3040, 801-265-8886.)

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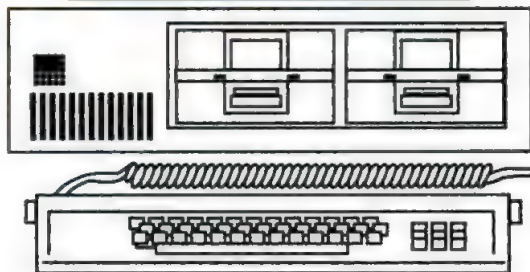
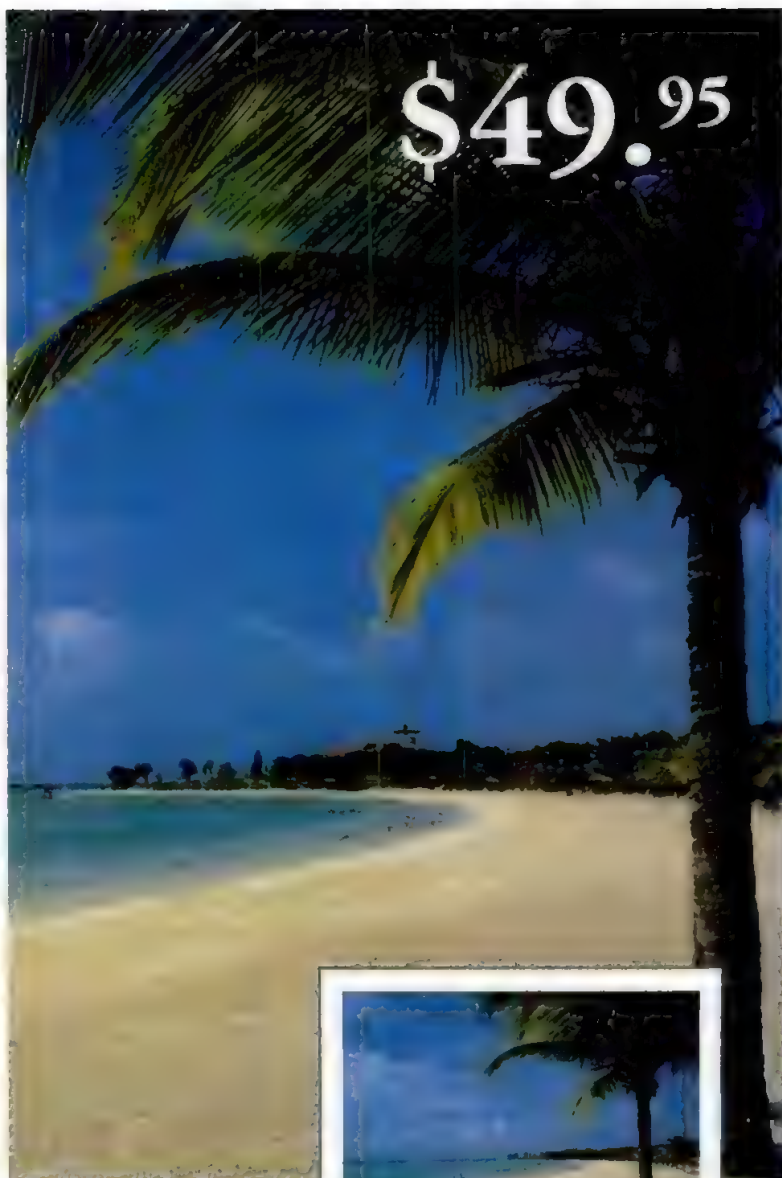
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APPLICATION MAP

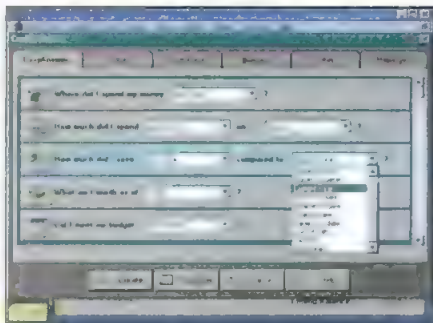
Complex software needs simple navigational aids, and Quicken offers them from the start. Intuit's EasyStep technology, pioneered by sister product TurboTax, clarifies Quicken's account setup tremendously. EasyStep walks you through a series of dialog boxes, asks you questions, and uses your answers to complete forms. And whenever you want to jump from one finance feature to another, just go to the enhanced HomeBase, where you'll find a graphical map for the entire program.

The Feature Explorer offers an alternate, more detailed route to Quicken's functions than the standard toolbar and menus do. You can select any of Quicken's Guide Cards—on-screen text (accompanied by audio clips in the CD-ROM version) that provide additional guidance for a particular area. You can also find extra guidance in Quicken's new EasyAnswer Reports. It gives you quick answers—via drop-down lists—to questions such as "What am I worth today?"

PULSE QUICKENING

The most exciting new element of this fifth Windows release of Quicken, though, is its

electronic banking capabilities. Account registers and forms haven't changed much, and you can still use them to prepare checks and other transactions for electronic



Quicken's reports are easy enough to customize and generate, but this EasyAnswers option makes it even simpler.

transmission. But now you can look at your account balance and details 24 hours a day and transfer money electronically. In addition, Intuit now incorporates its own edition of Netscape Navigator 1.22.

There are now 22 financial institutions (including 20 major U.S. banks) that participate with Intuit, and they each charge a different amount—averaging \$3 per month—for use of these electronic services. Some banks' services are free, but actual bill-paying through banks may cost substantially more than what Intuit itself charges to pay bills. Every month, Intuit will pay up to 20 bills and charge you \$5.95. Thereafter, each group of 10 bills will cost you \$2.95. And

you can continue to use CheckFree through Quicken, but only if you've used CheckFree before; it's not offered to new Quicken users.

The "Deluxe" in Quicken's new title refers to its intelligently presented financial resources, which you can access by clicking on the Deluxe Gateway. From there, you can easily navigate between resources. The new Finance 101 is an interactive multimedia guide to personal finance basics that provides worksheets to help you apply concepts to your own situation. In Ask The Experts, financial mavens Marshall Loeb and Jane Bryant Quinn

graphs simultaneously—users would have benefited more from one undivided group of charts.

But in the area of tax planning, Quicken remains competitive. You can move data into the Tax Planner and get an estimate of your annual taxes. And if you import your data into Intuit's TurboTax, you'll obtain the best link available—Quicken's Tax Link Assistant—between a personal finance program and a tax product.

As you might expect, this much depth and functionality slows Quicken down a little (screen redraws, for example,

could be quicker). Ultimately, though, no other program rivals Quicken Deluxe's new-user and navigational aids, expert advice, and interactive financial information. And only Microsoft Money tops its easy, flexible management of personal financial

accounts.—Kathy Yakal □

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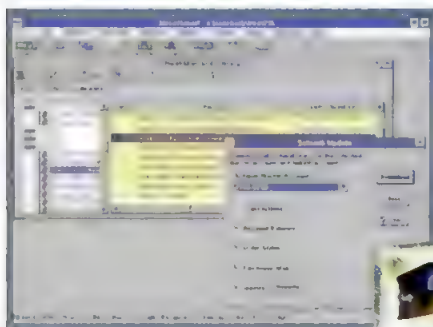
Quicken Deluxe for Windows

Checkbook management	A
Budgeting	A
Tax and financial planning	A
Portfolio management	A
Electronic connections	A
Overall value	A

Quicken Deluxe 5 for Windows. Estimated street price: \$59.99. Requires: 8MB RAM, 24MB hard disk space, Microsoft Windows 3.x or Windows 95. Intuit Inc., Menlo Park, CA; 800-816-8025, 415-322-0573; fax, 520-295-3014.

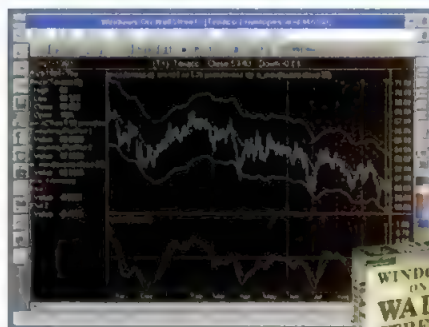
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StreetSmart for Windows, by Charles Schwab & Company Inc.



If you're one of discount broker Charles Schwab's customers, StreetSmart (\$39) can keep the details of your portfolio in one place. An improved interface lets you execute on-line trades, query account balances, and keep track of your transactions. (800-334-4455, 415-627-7000.)

Windows on WallStreet, by MarketArts Inc.



A minor upgrade to last year's Editors' Choice, Windows on WallStreet (\$74.95) is a good introduction to technical analysis for beginning-to-intermediate investors. You can choose from CompuServe, Dial/Data, or Dow Jones News Retrieval. (800-998-8439, 214-783-6792.)



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Coming Up

Top Web Sites

The World-Wide Web is no longer a technological novelty; it is a cultural phenomenon. To help you sift through this ever-growing mass of information, we have followed up our inaugural list of the top 100 Web sites (April 11, 1995) with an updated guide for 1996. Our favorite Web pages cover everything from computing to news to reference to government. You will see the best in digital graphics, video, sound, and design, not to mention dancing icons and virtual shopping malls. If you are currently not on the Web or have trouble getting around it, we will show you how to connect and introduce you to the Internet's most popular search sites.

Digital Cameras

For *PC Magazine's* first-ever filmless camera roundup, we've selected the least expensive entry-level devices designed primarily for business users—not professional photographers. Manufacturers are hoping that the business sector will see them as a quick, easy, and affordable alternative for capturing images best suited for applications where image quality and size are relatively unimportant. Among average users, the \$650 to \$1,000 price tag alone will keep some at bay, at least until all the kinks and bugs are worked out. We tested setup procedures (even the ease of loading the batteries), memory capacity, and such functions as ease of use, the time it takes to upload images to the computer, and recycle time—but image quality will probably be your deciding factor.

Business Graphics

Business graphics software today fulfills practically every need imaginable. We review diagramming and charting packages—applications with more automation, elegance, flexibility, and power than ever before. No longer will finicky and repetitive manual labor play a part in your diagram and chart constructions. Anyone can now easily and intuitively transform data into area charts, flow charts, Gantt charts, organization charts, schematics, space-planning charts, spreadsheets, surface graphs, and tons of other types of diagrams and charts. We also take a look at a slew of scientific graphing packages, designed for the technically savvy.

New OCX Controls, Part 2

If you develop applications with Microsoft Visual Basic 4.0 or any of the newest in C++ compilers, the new OCX control format can make your life easier. In the second half of our OCX story (see "Prepackaged Power: New OCX Controls," in this issue for part 1), we continue to review the leading core controls and environment enhancements.

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NE—Network Edition.

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Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Special Report: Is Barbie's Workplace An Ergonomic Disaster?

When Barbie's Dream Workstation arrived at the ARF offices as part of an eShop Inc. promotion, we were troubled by some aspects of its design. But rather

than trying to pass judgment ourselves, we decided get an expert opinion, so we invited Barbie down to PC Labs to hear what she had to say about it.

THE DIGITAL CLOCK

"It's stuck at 10:15. What do they think—that I'm on some kind of permanent coffee break? It's kind of insulting when you think about it."

THE BOOKS

"They don't have pages. I've been fighting this dumb-blond image for years, so why can't they give me books with words in them?"

THE APPLICATIONS

"I've got two: a bar chart and a heart. When I press the keyboard I multitask, or dual-task at least."

THE AQUARIUM

"As if I have time to stare at fish all day! I'm a busy professional. What I really need is a place for my Mattel mouse pad."

THE CHAIR

"I don't see why they felt the need to bolt it to the desk. Who'd want to steal it anyway? It's hideous!"

THE COMPUTER

"What computer? Hello? There is no computer. Just a monitor. I consider that a fatal flaw of the workstation. I mean, dumb terminals are so '88."

THE KEYBOARD

"Well, the keys are fused, but I guess that's okay because my fingers are fused, too."

Alabama Burglars Have Consciences—Sort Of

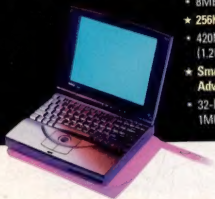
More bizarre doings as noted in a small-town police blotter: "An Airport Road resident reported the theft of the hard drive of his computer. He said he noticed the computer was not working properly and thinks someone took his hard drive and replaced it with a less efficient one."—*THE CULLMAN (ALABAMA) TIMES*

ARF Interactive

SuperPro Deluxe 95? Ultra for Windows? SmartWork Gold Edition? It's time to decry the proliferation of utterly meaningless polysyllabic product names. Feel free to invent the most useless, emptiest, tongue-tangling software name you can think of. Entries must have at least four syllables, and the most meaningless three submissions will win. Mock away—and please be as merciless as possible!

If your entry is used, we'll send you \$50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802. Winner this issue: Nancy Cornett.

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